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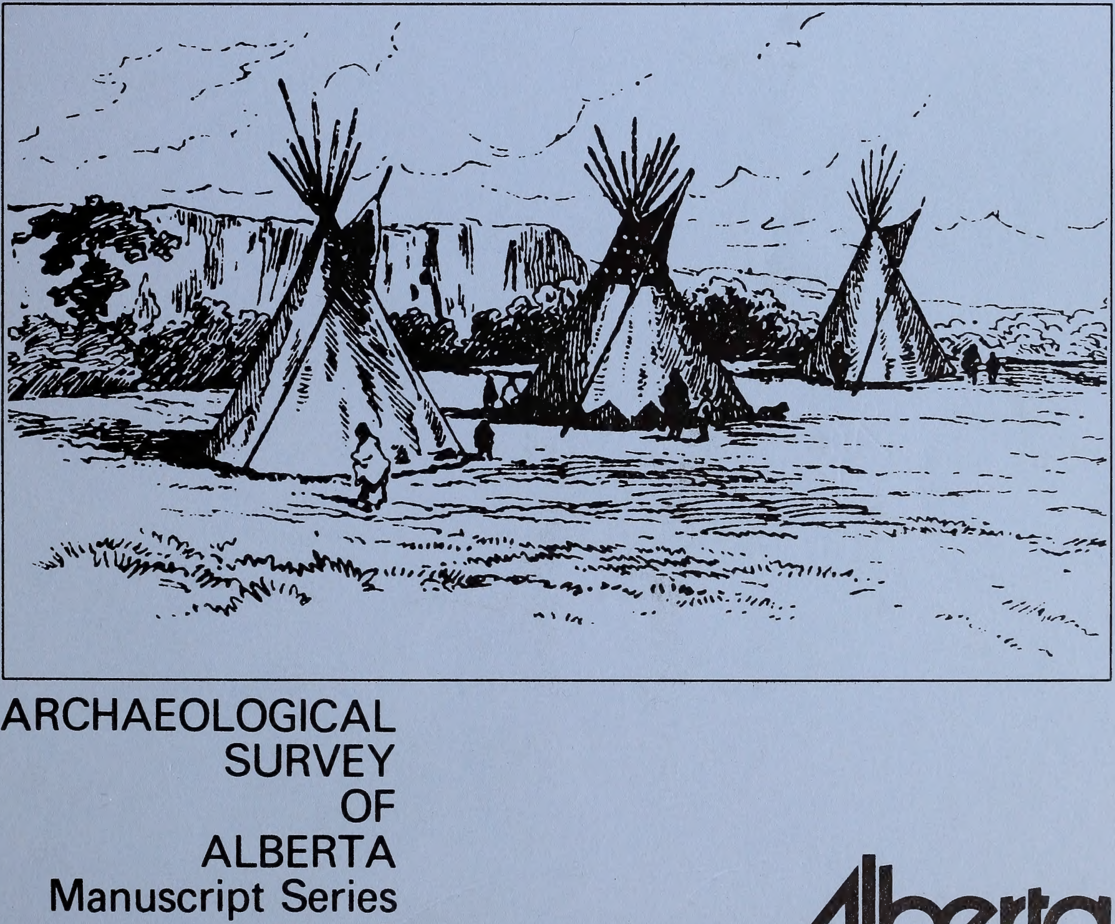
ROSS GLEN: A BESANT STONE CIRCLE SITE IN SOUTHEASTERN ALBERTA

J. Michael Quigg



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ROSS GLEN: A BESANT STONE CIRCLE SITE
IN SOUTHEASTERN ALBERTA

by

J. Michael Quigg

Ethos Consultants Ltd.
Historical Research Associates

ARCHAEOLOGICAL SURVEY OF ALBERTA
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ROSS GLEN: A BESANT STONE CIRCLE SITE IN SOUTHEASTERN ALBERTA

by

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59807

1982

ABSTRACT

Excavations conducted at the Ross Glen site (DlOp-2) in southeastern Alberta during 1981 yielded considerable quantities of data with scientifically significant results. These investigations were required at this high-value prehistoric stone circle site because Hat Development Ltd. planned to obliterate the site for a proposed housing subdivision in Medicine Hat. Ethos Consultants Ltd. conducted the excavations (a total of 508 square metres) by focusing on specific objectives developed from a previous assessment program (Quigg 1980).

These investigations yielded evidence of at least three prehistoric occupations - two during the Middle Prehistoric Period and one undated occupation. Cultural material was quite abundant (a total of 26,209 pieces), including quantities of lithic debitage and fire-broken rock, 42 ancillary features, sparse faunal remains, and formed tools within and adjacent to the 18 stone circles. The cultural material and features reflect the occurrence of extensive food and hide processing and general camping activities at DlOp-2. Approximately 2 percent of the estimated site area (which totals 37,800 square metres) has now been investigated. The Besant occupation appears to be the principal occupation at the site; it was dated to A.D. 500. It is postulated that two Besant hunting groups occupied the site simultaneously, in the fall of the year, to undertake kill operations in preparation for the coming winter.

There was direct artifactual evidence (Bitterroot, Hanna and Oxbow points) of a second Middle Prehistoric occupation with, at present, one stone circle (Stone Circle 13) and one ancillary feature (Feature 12) having been linked to this occupation. A radiocarbon date of 3,010 B.C. ± 160 years from Feature 12 supports this other occupation. There are similarities between the Besant and the latter occupation, such as the actual tool assemblages, use of stone circles, hearths, and post molds; differences in material distribution and projectile point styles are also present.

The undated occupation consists of two stone circles located in the southeast corner of the site. No diagnostic artifacts were recovered; however, the lack of tools, the types and distribution of ancillary features, the general distribution of cultural material, and the depth

and size of the stone circles support a different occupation than that represented by the main Besant camp.

A number of factors make DlOp-2 an extremely important site. They are: a) the discovery of numerous well preserved and varied ancillary features; b) the quantity of lithic debitage and fire-broken rock, post molds, and patterns in the distribution of these materials; and c) the contemporaneity of many of the stone circles. Essentially, it is suggested that the Ross Glen site (DlOp-2) is one of the most significant stone circle sites yet investigated in Alberta and possibly in all of the Northern Plains.

ACKNOWLEDGEMENTS

This document is a combination of two separate investigations; thus, numerous individuals and agencies are thanked for their contribution. Funding of the initial site assessment and subsequent analysis of material was provided by the Archaeological Survey of Alberta, where the author was employed as Plains Archaeologist. A debt of gratitude is extended to Dean Wetzel, Mike Balough and Scott Hamilton for their dedication and extremely hard work in completing the extensive assessment in the time allotted. Randal Brown and James Goruk catalogued the 12,000 specimens gathered that season, and Dean Wetzel manipulated much of the data. The assessment data were incorporated in this report as background information. George Andreaff from Systems, Data and Planning Branch of Alberta Culture conducted the various statistical tests and provided the expertise in that area. Charles Cheng drafted the stone circle and material distribution maps included from the 1978 assessment. Thanks is extended to Dr. Raymond LeBlanc for his comments and extensive editorial assistance in the original assessment manuscript.

The 1981 excavation (permit 81-95) was funded by the developer, Hat Development Ltd. of Medicine Hat, and was conducted under the direct supervision of the author. Considerable assistance was provided by the field staff of Stan Saylor, Leigh Heikkila, Barry Dau, Carol Rushworth, Margaret Greene, Kim Anderson, Kit Krozser, Leslie Kime, Pam Olson and Gary Hackler. Janice Andreas drafted the various figures included in the section on the 1981 investigations and Stan Saylor photographed and processed the artifact photos. Stan also undertook the analysis and writing of the section on ceramics. Margaret Greene and Kim Anderson conducted the stone tool analysis, as well as the sorting, compilation and organization of all raw field data. Carol Rushworth carried out the computer input and analysis of tool and stone circle data. Donna Thane was responsible for typing of the drafts and the final manuscript. The majority of editing was done by Stan Saylor, with some structural and editorial changes by Dr. Richard Morlan.

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1.0 INTRODUCTION

The Alberta Historical Resources Act of 1973 and its amendments (Government of Alberta 1973) provide for the preservation, study and interpretation, orderly development, and promotion of appreciation for Alberta's historic, prehistoric and palaeontological resources. The Historical Resources Division of Alberta Culture is responsible for the administration of the Act.

The Act states that a "historic resource means any work of nature or of man, that is primarily of value for its palaeontological, archaeological, prehistoric, historic, cultural, natural, scientific or aesthetic interest, including, but not limited to, a palaeontological, archaeological, prehistoric, historic or natural site, structure or object."

The major objective of an historical resource impact assessment (H.R.I.A.) is to ensure preservation of Alberta's past by preserving significant historical resource sites, either through avoiding the known site altogether or by recovering the essential elements of those sites which will be destroyed during development.

Once sites have been identified within the development zone, assessment of their value or potential for contributing to our knowledge is undertaken. This is accomplished by recovering specific aspects of each site and comparing them to other known sites in order to evaluate their overall significance and potential for advancing our knowledge.

The scope of work includes a review of known sites in the provincial file for the general area in question. A review of the number and types of sites will provide an impression of the historic value of the development area and, consequently, will influence interpretations and recommendations concerning newly discovered sites.

A ground reconnaissance of the entire development zone is the initial research step, coupled with subsurface testing to locate the major historical resources which will be affected by the development. Once located, an evaluation or assessment is conducted at each site in order to gain a basic understanding of the type, quantity, quality and significance of each site, thus providing the basis for subsequent recommendations. These recommendations include options such as:

a) avoidance of the site; (b) detailed mitigative excavations if the site is to be destroyed and is of high value; or (c) no further work because of the low value of the site.

The developer, Hat Development Ltd., was requested by Alberta Culture to undertake a historical resource impact assessment on the proposed housing subdivision development of the Ross Glen Buffer Strip in the City of Medicine Hat (Figure 1). Ethos Consultants Ltd. was subsequently retained in the spring of 1981 to conduct the necessary investigations to satisfy the government's request. Under Archaeological Survey of Alberta permit 81-26, subsurface and surface investigations located two previously unrecorded prehistoric and one historic site adjacent to the known Ross Glen site (DlOp-2). The three newly recorded sites were assessed, and a report detailing the findings, interpretations and recommendations was completed (Quigg 1981b). The Ross Glen site had previously been assessed in 1978 by the Archaeological Survey of Alberta (Quigg 1980) and was considered to be of high value. Except for outlining the various recommendations, the site had not been dealt with in any detail under permit 81-26. A proposal for detailed excavations of the Ross Glen site was subsequently submitted to Hat Development Ltd. by Ethos Consultants. Hat Development elected to fund excavation instead of avoiding the site. Alberta Culture approved the proposed investigations, and the project was initiated. A second permit (81-95) was obtained from the Archaeological Survey of Alberta to undertake this mitigative work.

The following report is a result of the archaeological investigations undertaken in 1981 at the Ross Glen site (DlOp-2). In order for the reader to have a clear understanding of the site and of the objectives of the mitigation, a rather lengthy archaeological discussion is provided on the data and interpretations resulting from the assessment completed in 1978.

2.0 SITE DESCRIPTION

The Ross Glen site consists of eighteen nearly completely buried stone circles (Figures 2 and 3), thousands of pieces of lithic debitage and fire-broken rock (FBR), and a minimum of 42 ancillary features (fire-broken rock piles, hearths, lithic concentrations, etc.). All

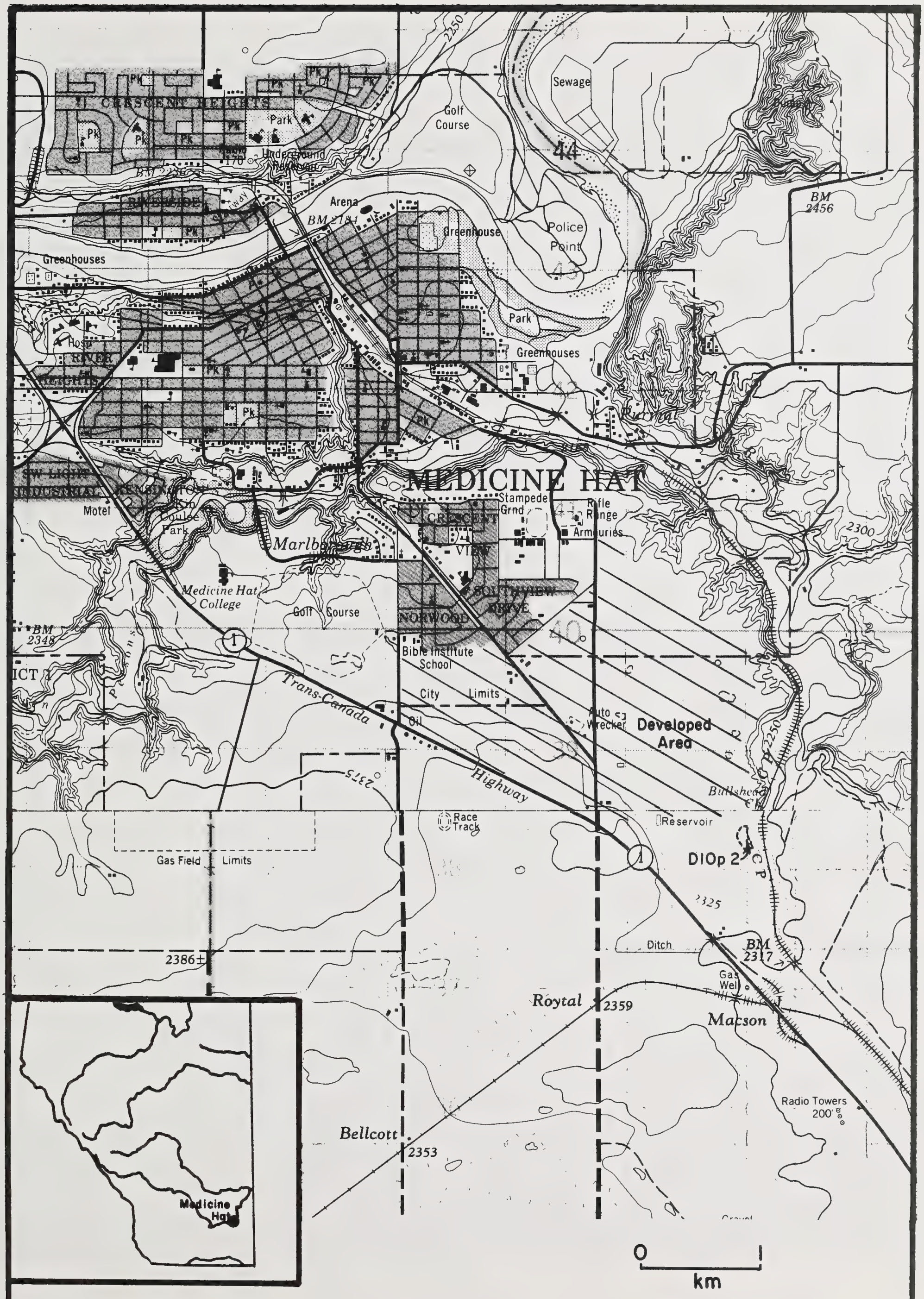


Figure I: Location of DIOp 2.

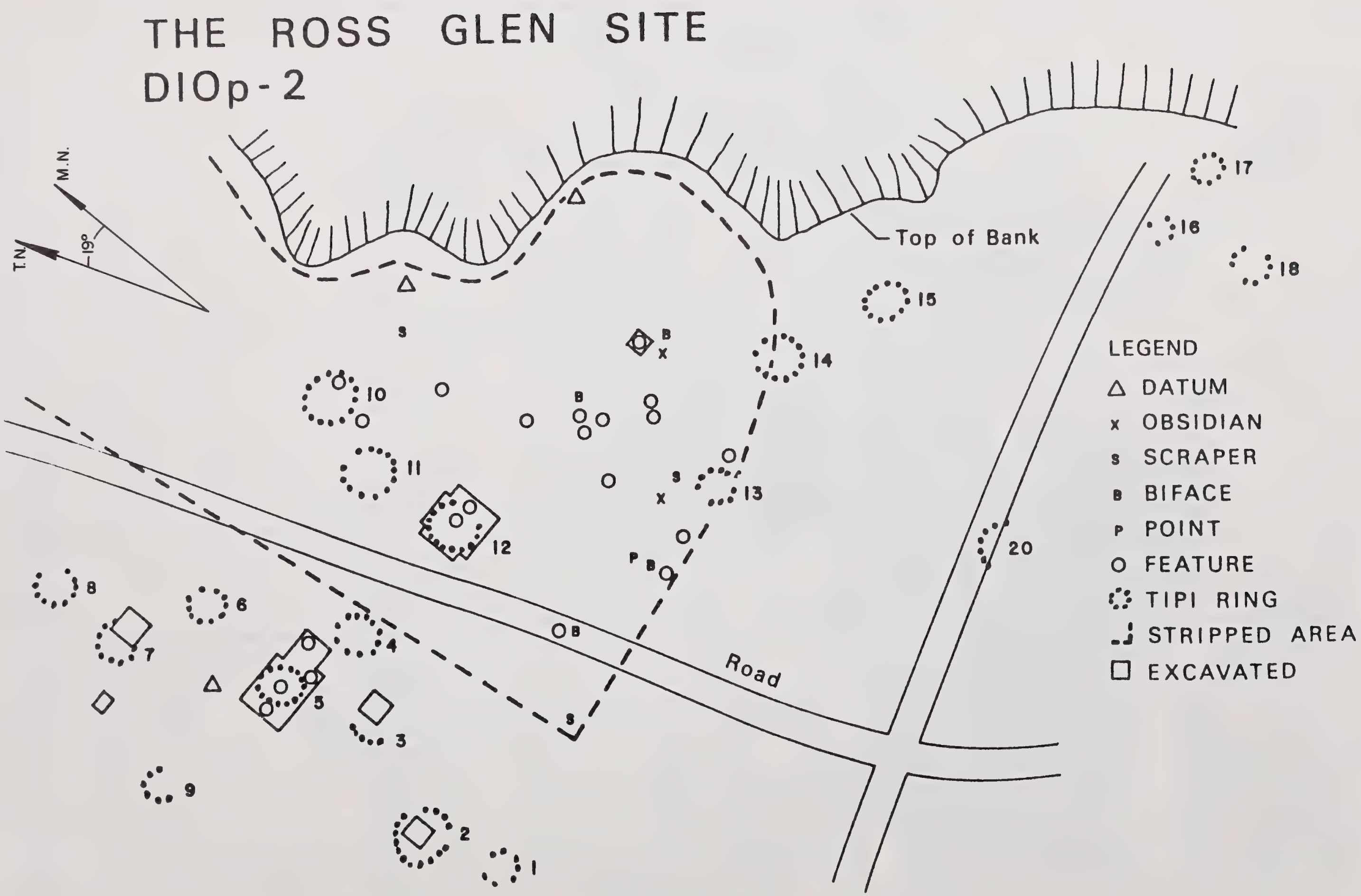


Figure 2: Planview of features and excavations in 1978.

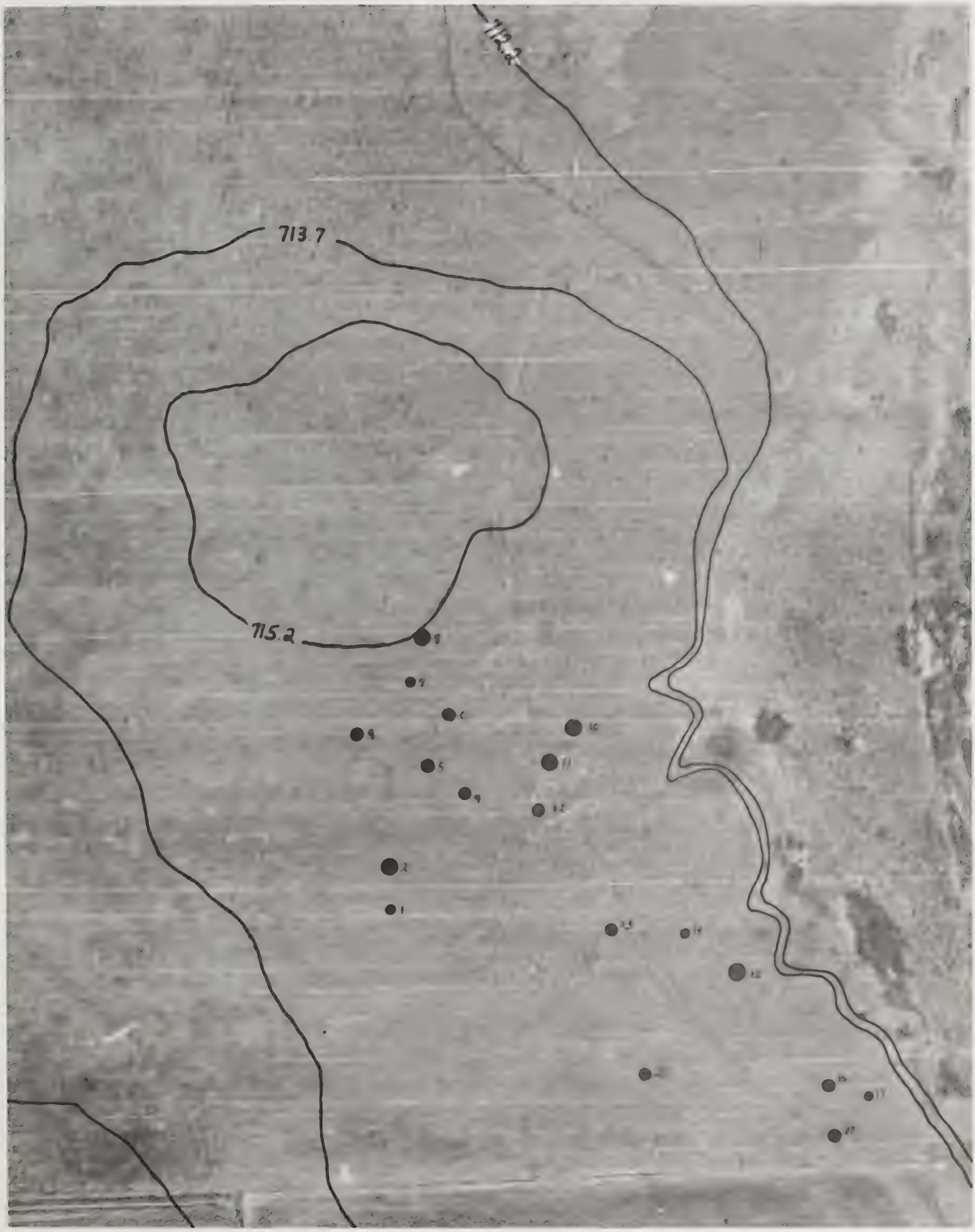


Figure 3: Location of Stone Circles Plotted on Air Photo of Ross Glen.

cultural material categories, except for the stone circles, were observed in a portion of the site which had previously been stripped of 2-4 cm of topsoil. During initial site discovery, two Besant projectile points and one endscraper were collected from the surface. Cultural material was observed to have covered an area of at least 180 x 210 m.

3.0 REGIONAL AND LOCAL SETTING

The Ross Glen site lies in southeastern Alberta in the Prairie Ecosystem region (Figures 1 and 4). More specifically, the latter encompasses the physiographic zone referred to as the Eastern Alberta Plains (University of Alberta Press 1969:9), an area covered by a mantle of glacial moraine, producing a gentle undulating landscape termed "swell-and-swale" (Green and Laycock 1967:79) or "knob and kettle" topography. The moraine is sporadically spotted by fluvial deposits consisting of silt and clay lake deposits, as well as sand and gravel outwash and two or three concentrated areas of wind-deposited sand dunes (University of Alberta Press 1969:8). Areas of the latter tend to be relatively flat in comparison to the knob and kettle regions. There are a number of specific features which break up the southeastern landscape. Although dry much of the year, Pakowki Lake, 76 km to the south of the site, is the largest inland drainage basin in southeastern Alberta. To the north (33 km) lie the Middle Sand Hills which form an extensive sand ridge. The Cypress Hills (1375-1525 m in elevation) are visible 32 km to the southeast.

This area of southeastern Alberta lies in the cool temperature zone and receives little annual precipitation; it is classified as a savannah climate (Longley 1967:67). It is typified by long, moderately warm summers and bright cool winters with periods of warmer weather caused by Chinook winds, which can bring temperature fluctuations of as much as 20 degrees Celsius (^{0}C) in a twenty-four hour period. Records for this region show a temperature variation of 88.3^{0}C, (159 degrees Fahrenheit [^{0}F]), from a low of -46.1^{0}C (-51^{0}F) in January, to a high of 42.2^{0}C (108^{0}F) in July (Webb, Johnston and Soper 1967:99). The mean temperature during the winter months of December, January and February is -12.2^{0}C (10^{0}F), while summer temperatures range between 25 and 30^{0}C

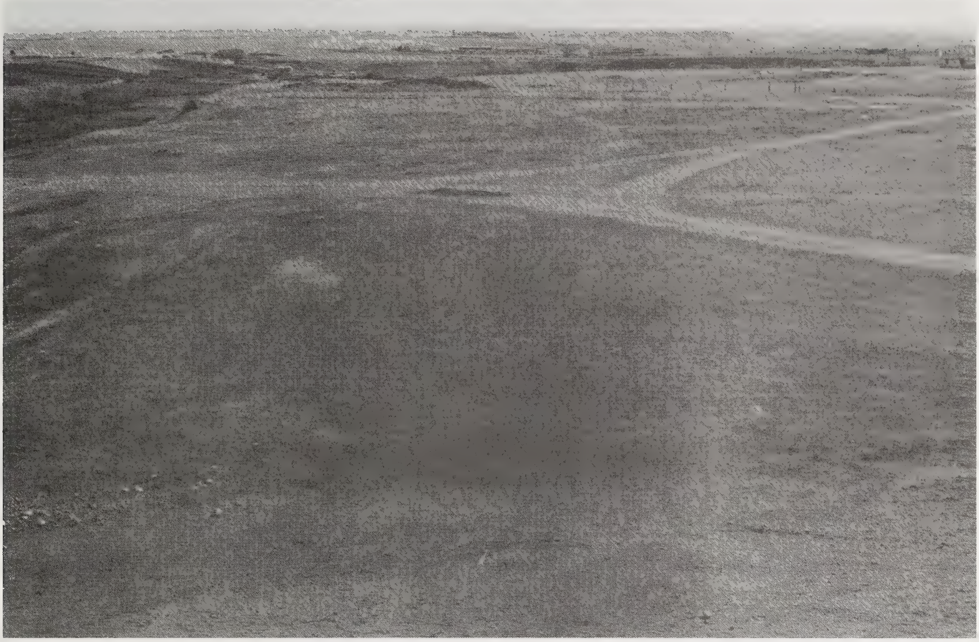


Figure 4: View south along Bullshead Creek (at left) with Ross Glen in middle.

(77-86°F) and average 20°C (68°F) during June, July and August (Longley 1967:61).

Precipitation in the region varies considerably, ranging from 30 to 43 cm (12-17 inches) per year; the area of the site receives approximately 33 cm (13 inches) per year. Rainfall does not occur evenly throughout the year but peaks in June and then drops off rapidly in July, occurring as brief rainshowers or thunderstorms (Fletcher 1972:24). Snowfall in the area averages 101 cm (40 inches) per year and occurs mainly in the months of December to February. The Chinook winds which free the ground of snow during portions of the winter.

The vegetation in this region is predominantly sturdy, short grasses, classified as Shortgrass Plains. Blue grama grass is dominant; taller spear and wheat grasses grow in localities with more moisture. Other vegetation includes cactus, low growing fringe sage, hoary sage, a number of forbs, mosses and lichens. Various combinations of these vegetation types depend upon the amount of moisture received by specific locales (Webb, Johnston and Soper 1967:100-103). While the site lies in the Brown Soil Zone, thin black soils lie a short distance to the north. Man has interfered with the vegetation community at this site, altering and camouflaging the naturally occurring combinations. Trees and bushes are confined to the edges of watercourses where increased moisture permits greater growth for species such as cottonwood, willow, rose bushes and various berry bushes.

The fauna of the region includes a wide range of species from two life zones: the Transition Prairie and the Upper Sonoran. Soper (1964:38) provides a list and discussion on these species, which include a wealth of resources available for utilization by prehistoric populations. Bison was the most important and dominant animal throughout the region in the past and has been documented archaeologically to be the mainstay of prehistoric subsistence.

The Ross Glen site (DlOp-2) lies between the outer edge of the Oldman End Moraine and the Pakowki End Moraine (Westgate 1968), just southeast of the South Saskatchewan River. This is the largest river in southern Alberta and flows eastward through a pronounced glacial outwash valley. Seven Persons Creek and Ross Creek are major tributaries, entering the valley four to five kilometers to the north of the site. The site is situated on the western edge of Bullshead Creek (Figure 2), which flows out of the Cypress Hills a few hundred metres south of the junction with Ross Creek. Ross Glen lies in an exposed location on the flat prairie level overlooking the creek. It is underlain by ground moraine of unsorted rocks, sand, silt and clay, with patches of lacustrine sand and outwash (Westgate 1968). The glacial drift, 15-30 m thick, is exposed on the surface at the northwest corner of the site, in the vicinity of Stone Circles 6, 7 and 8. Lacustrine sand encompasses the remaining site area.

Vegetation across the surface of the site includes sage brush, prickly pear and pincushion cactus, blue grama grass, spear grass, and a variety of ground mosses and forbs. The small creek valley below DlOp-2 provides a greater diversity in vegetation with taller shrubs (some of which are berry-producing) and grasses.

4.0 PREVIOUS SITE ASSESSMENT

4.1 INTRODUCTION

A two month assessment program was conducted in July and August of 1978 by a four man crew, sponsored by the Archaeological Survey of Alberta and directed by the author (Quigg 1979, 1980). At that time, a detailed assessment program gathered data on each individual stone circle by recording the number of stones, their weights and depths, followed by site mapping and the excavation of some 246 square metres. The latter encompassed the excavation of stone circle interiors (100.4 square metres), areas outside stone circles (145.6 square metres), and two of the ancillary features. A judgemental block sampling procedure was employed. Two stone circles were completely excavated, and two others were sampled. Areas outside the features were also sampled. All soil except for the sod level (top 3 cm) was mechanically screened though a 6 mm mesh. Samples from ancillary features were fine-screened through 1 mm mesh. The following descriptions and discussions in Section 4 deal strictly with the 1978 assessment program which was sponsored by Alberta Culture, Archaeological Survey of Alberta.

4.2 CULTURAL AND NATURAL STRATIGRAPHY

The location of DlOp-2 on the flat prairie level did not allow for extensive sediment build-up through time. Wind-blown deposits had been sufficient, however, to nearly cover the stones comprising the stone circles and to bury smaller cultural items. Upon excavation, cultural material was encountered between 4 and 19 cm below the surface, with no distinctive floor level or concentration detected. The base of most of the stones in the ring features showed the same depth range, although two rings (16 and 17), located at the southeast corner of the site, appeared much higher and more exposed than the others.

An intensive analysis of the data from the stone circles (especially depth and size) reveals that at least two occupations are represented, consisting of a minor event at Rings 16 and 17 and a major event represented by all remaining rings.

4.3 CULTURAL MATERIAL

The 246 square metre assessment program conducted in 1978 revealed a total of 18,824 pieces of cultural debris, including 12,582 pieces of lithic debitage, 6,192 pieces of fire-broken rock, 50 formed tools, 127 g of faunal remains, and 23 clusters of material termed ancillary features. The total represents an average of 75 items per square metre, which is considered to be quite high.

4.3.1 Fire-Broken Rock

Fire-broken rock (FBR) is a by-product of human activity, principally the result of stone boiling activities. It represents approximately 40 percent of the total cultural material (6,192 pieces weighing a total of 326.7 kg). The pieces were divided into size categories (0-4.9 cm, 5.0-9.9 cm and 10.0-15.0 cm) from inside or outside a specific feature (Table 1). The majority of FBR specimens (80 percent) are from the small size category (4,951 pieces weighing 61.9 kg). This group is followed by the medium-sized specimens (1,074 pieces weighing 139.8 kg). Only 167 of the larger pieces (weighing 125 kg) were recovered.

The FBR was either discovered in recognizable clusters (ancillary features) or observed scattered over the site's surface. Considering distribution, there was more than twice as much FBR (25.2 versus 11.9 pieces per square metre) inside stone circles as there was outside stone circles, excluding Ancillary Feature 1 from these figures (Table 2). The latter overlapped the edge of Ring 12 and thus was neither inside nor outside. The weight of the FBR in comparison to the number of specimens is even more pronounced with respect to the distribution inside of the rings. The distribution maps showing the scattered FBR suggests a tendency to discard FBR towards the eastern edge of the rings (Figures 5-7). This observation gains support from the location of recognizable features (e.g., Ancillary Feature 1) also located at the eastern side of the ring. Each of the three different size categories show the same inside-to-outside ratio as the total number.

The scattered FBR inside or immediately adjacent to the rings was probably discarded during multiple events and processes, as was the FBR

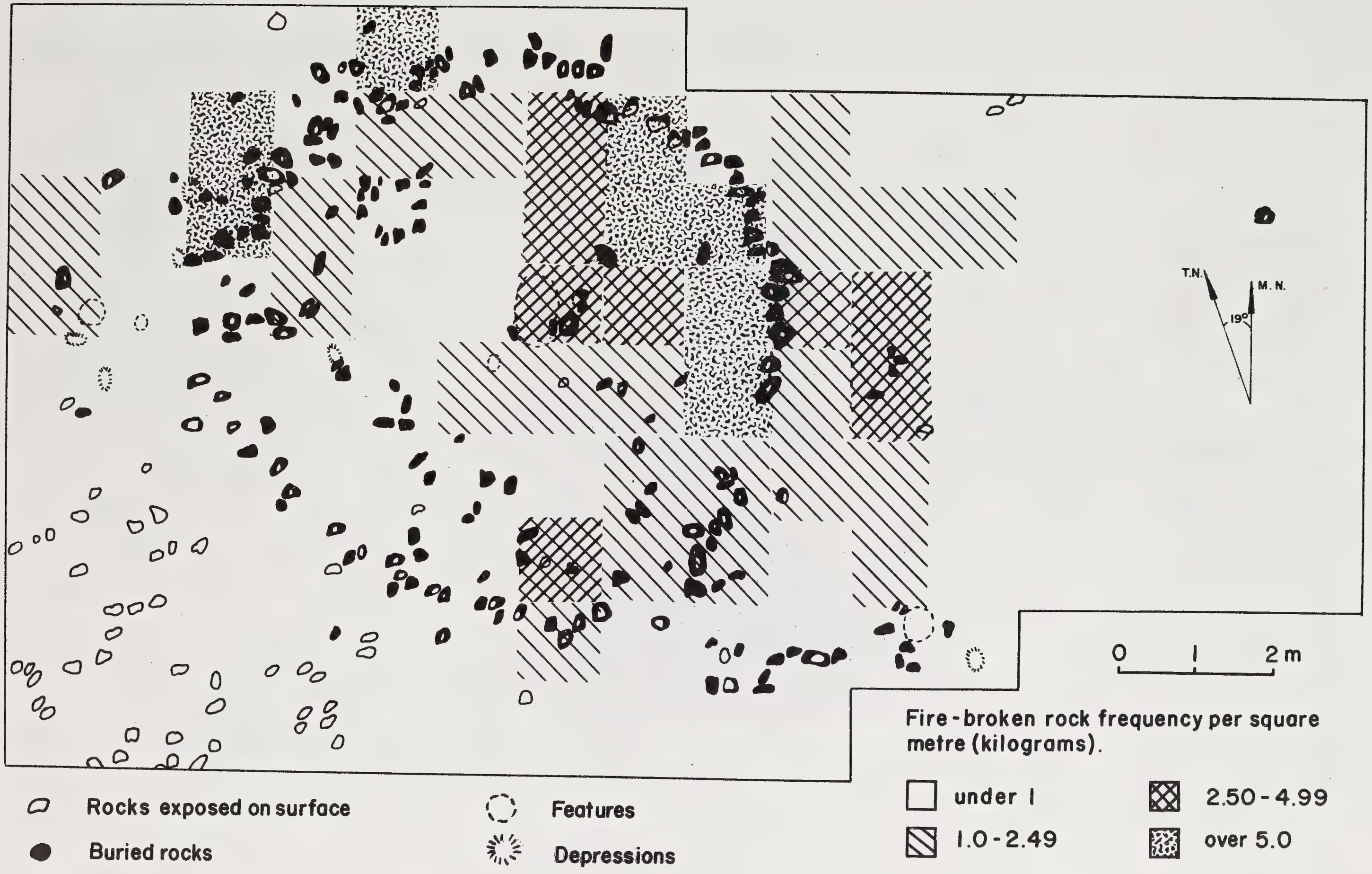


Figure 5: Fire-broken rock frequency, stone circle 5, DlOp 2.

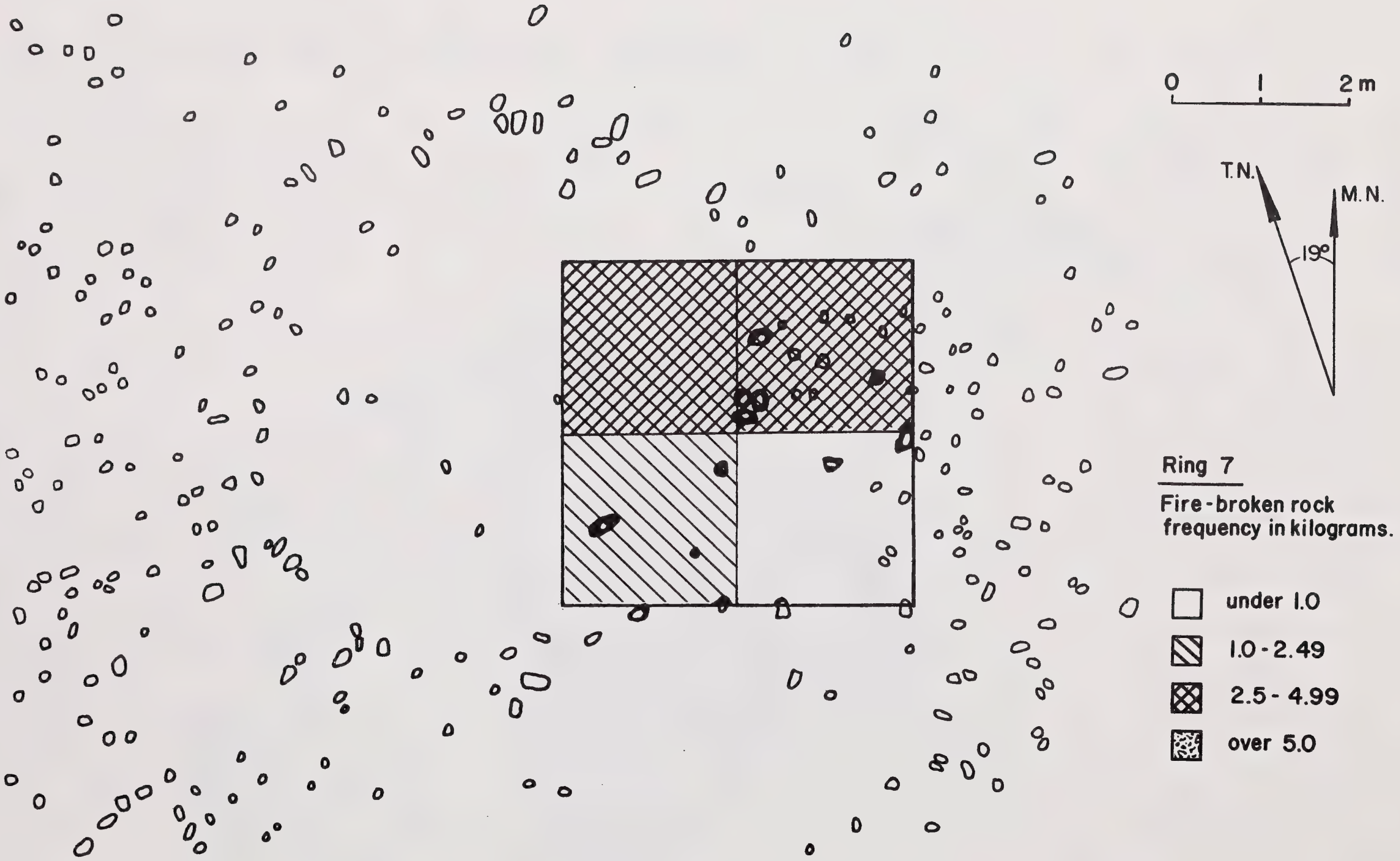


Figure 6: Fire-broken rock frequency, stone circle 7, DIOp 2.

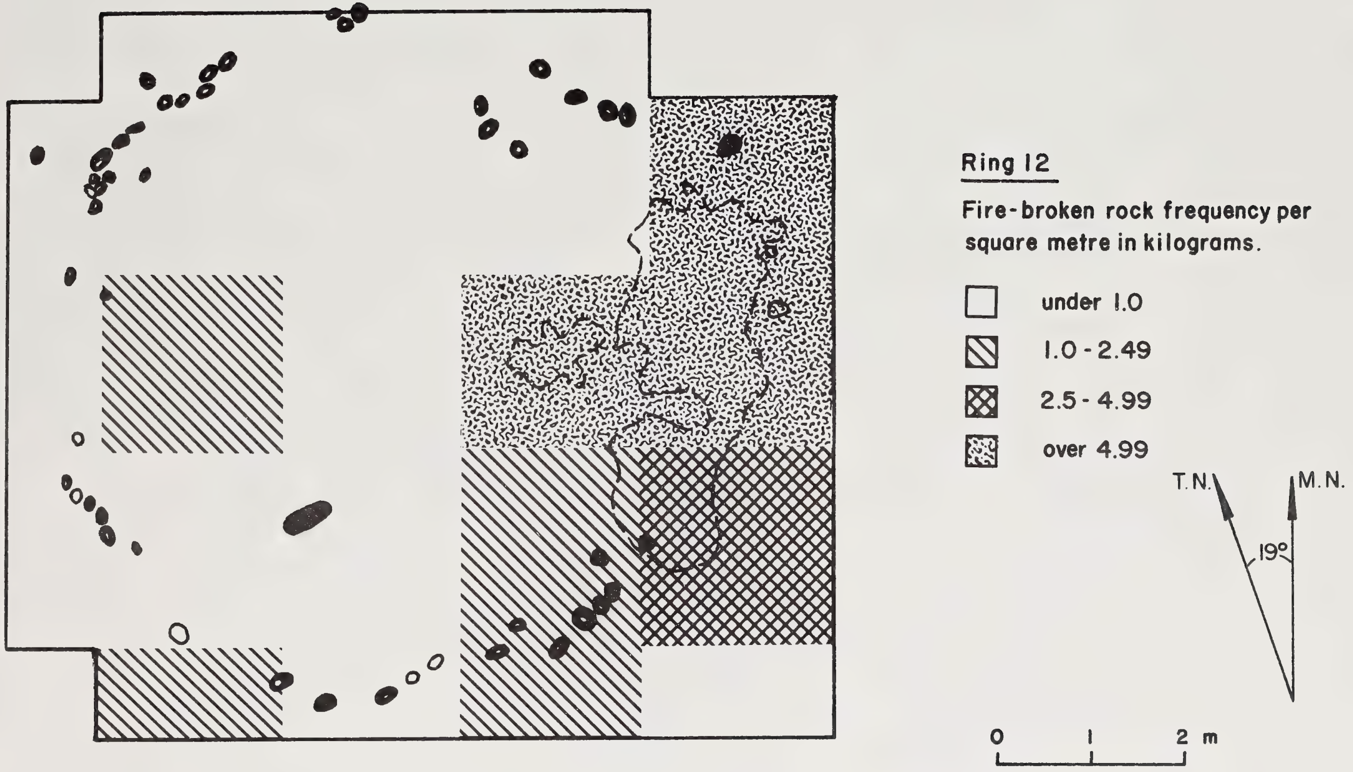


Figure 7: Fire-broken rock frequency, stone circle 12, DlOp 2.

in features, labeled "refuse piles" (e.g., Ancillary Feature 1), which likely accumulated over a period of time. These observed patterns are believed to have resulted from cleaning activities within the structure.

4.3.2 Bone and Charcoal

A total of 127 g of bone and 20 g of charcoal was recovered from the excavation. Ancillary Feature 3 contained tiny (0.1-0.5 cm) burned and calcined bone fragments (34.5 g), plus small amounts of carbon. Badly weathered bone fragments (66 g) were collected from beneath, or were mixed in with, fire-broken rock concentrations. The decomposed state of these fragments suggests that the site contained considerable bone at one time but that most had been chemically destroyed. Only the calcined and buried bone was preserved. A total of 91 g were submitted to Geochron Laboratories for dating. The results are discussed in a later section of this report.

4.3.3 Debitage

Debitage is defined here as lithic material removed either intentionally or unintentionally during the course of chipped stone tool production and use. In addition, debitage exhibits no discernable evidence of subsequent modification or use.

Debitage can be subdivided into two main groups, flakes and shatter. Flakes exhibit production characteristics consisting of either complete or partial striking platforms or bulbs of percussion. Shatter exhibits no such production characteristics (i.e., distal flakes and block fractures). Both flakes and shatter can be divided into primary, secondary or tertiary categories based on the presence or absence of cortex. Fifty percent is the arbitrary dividing line between primary (greater than 50 percent) and secondary (less than 50 percent); little or no cortex is present on tertiary specimens.

Lithic debitage (a total of 12,582 pieces) dominated the material remains, with a 2:1 ratio of inside versus outside distribution (Table 3). A pattern of distribution inside the stone circles (Figures 8-10) was evident as well. There was a heavier concentration near or adjacent to the centre of the rings and at the eastern edge of the ring in a

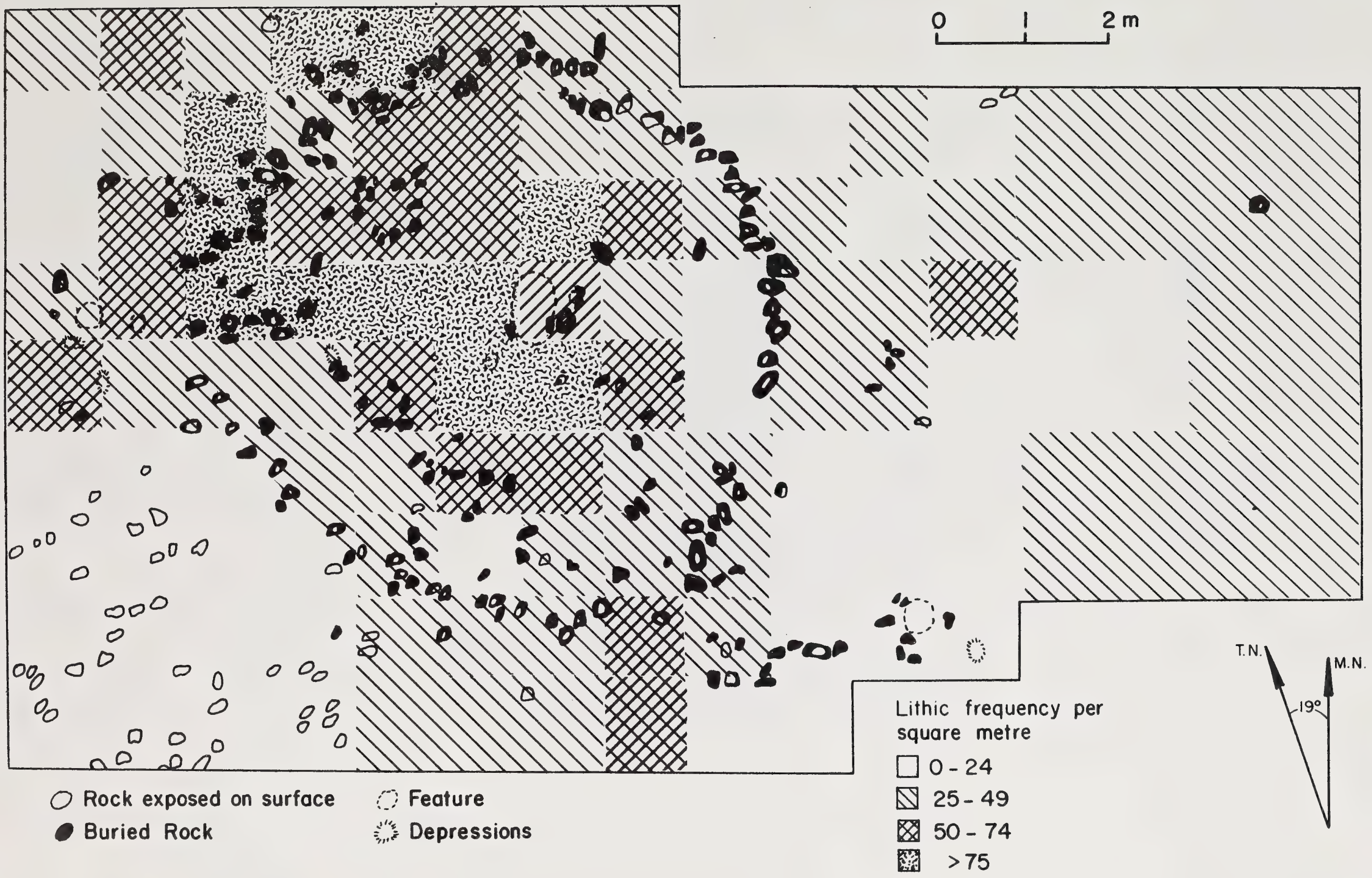


Figure 8: Lithic frequency, stone circle 5, DlOp 2.

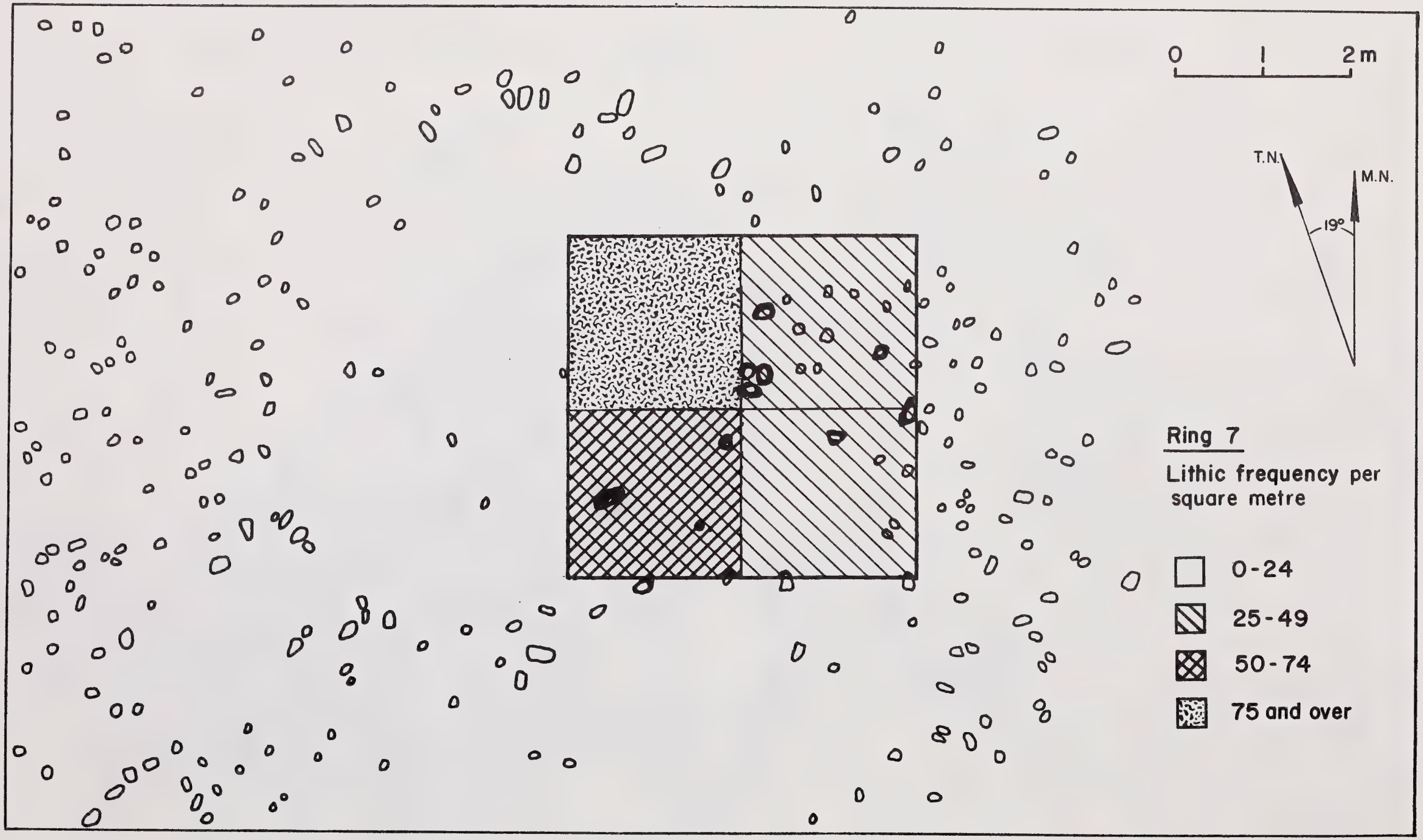


Figure 9: Lithic frequency, stone circle 7, DIOp 2.

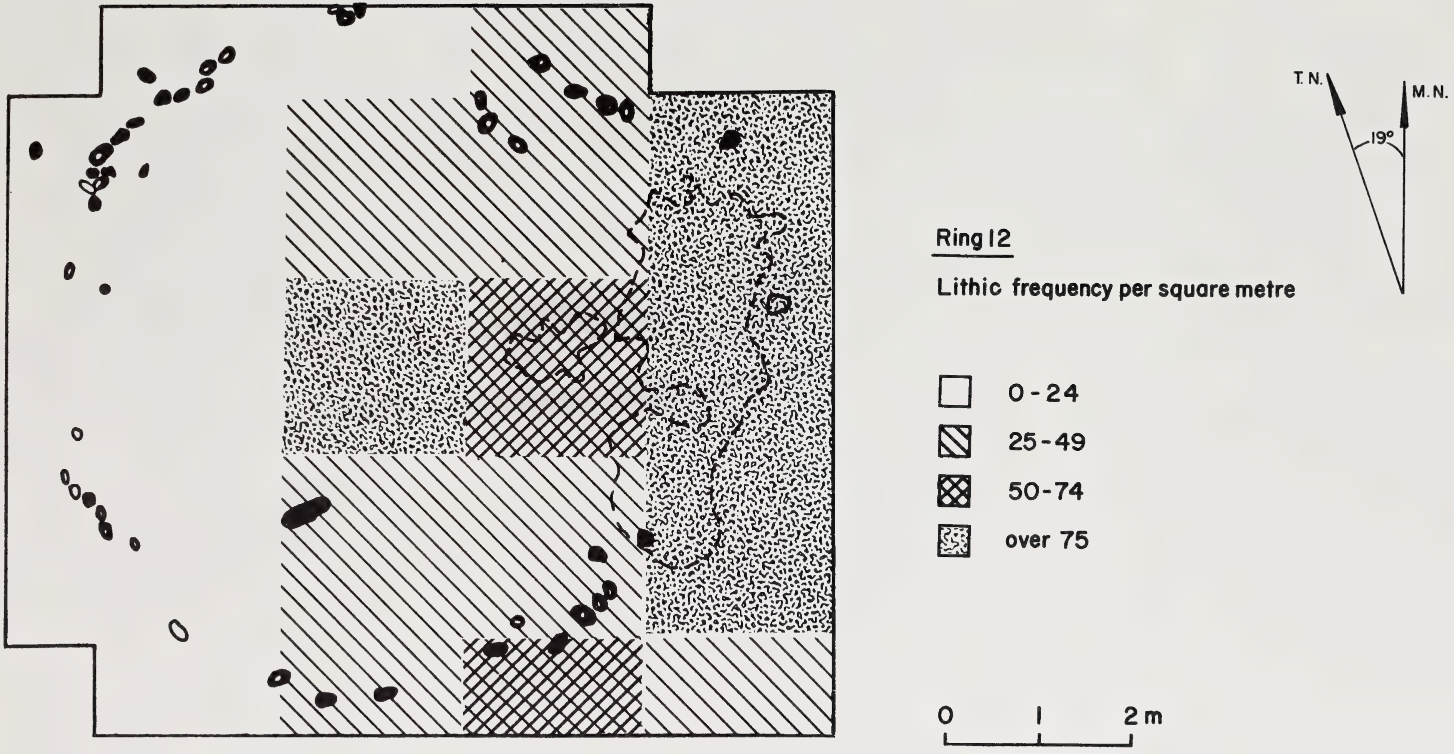


Figure 10: Lithic frequency, stone circle 12, D1Op 2.

couple of instances (Rings 7 and 12). Quantities of debitage were also found in the refuse piles such as Ancillary Feature 1.

Lithic material types represented by the debitage are dominated by local quartzites (82 percent), argillites (13 percent), white chert (Swan River Chert, 3 percent) and a few other varieties of chert (Table 3). Obsidian, Avon Chert and other types are considered to be non-local materials which were transported to the site. Pebble cherts and petrified wood, both locally available, were relatively infrequent. Considering that gravel outcrops on the surface of the site, the local materials were readily available. Debitage size is also important, with all the non-local material represented by very small pieces in comparison to the sizes of the local materials.

A 16 percent sample (n=2,050) of the total lithic debitage was analyzed with respect to manufacturing stages. To ensure that the sample was representative, groups of approximately 500 specimens each were selected from four different areas of the site, divided roughly equally between the inside and outside of the stone circles. Table 4 reveals the frequency and specific location of each of the categories.

Broken flakes and block-fractured specimens represent the shatter. The low frequency of both primary and secondary decortication flakes (1.66 percent) implies that basic cobble reduction took place in other localities. There is a high frequency of secondary flakes (34.73 percent) and small resharpening flakes (24.39 percent), implying that tool manufacture and tool maintenance were extensively pursued in the areas sampled at D10p-2.

The distribution of manufacturing stages observed in the sample revealed that more secondary decortication flakes, broken secondary flakes and block-fractured specimens were located inside of the stone circles than were located outside. Resharpening flakes were more frequent outside the stone circles. The author interprets this to mean that cobble reduction and the production of large blanks were done elsewhere in the site; tool finishing took place both inside and outside the features; and most resharpening occurred outside.

4.3.4 Tools

The number of stone tools is limited (n=29) and consists of points, bifaces and endscrapers. Time constraints and the quantity of lithic debris did not allow for the close scrutiny of individual specimens; thus, cores and marginally retouched stone tools (MRST) are not dealt with at this time. Detailed metric and non-metric data for the individual stone tools are presented in Tables 5-7.

All six projectile points are fragmentary (Figure 11), made of local material, transversely snapped, and show considerable lateral edge damage. Three are complete enough to be identified as Besant, while the broken specimens are considered to be atlatl dart points. The points were found both inside and outside the stone circles, but no specific pattern was detected.

Bifaces comprise the most frequent (n=12) tool type (Figure 12). All were manufactured from local lithic types, and the material type (chert or quartzite) obviously affected the size of the end product (Table 6). It is assumed these tools were manufactured on-site for use in cutting meat. The overall distributional pattern suggests that bifaces were utilized inside (#673 in Ring 5 and #4872 in Ring 7) and outside the rings (#2634, 4098, 1093 and 2560). It also implies that, upon breaking, the pieces were generally discarded into refuse piles. Two bifaces, #4870 and #8509, were adjacent to Refuse Pile 17, and 6 fragments were inside Feature 10. Once broken, there appears to have been no attempt to reuse or rework the original specimen. This pattern can probably be explained by the quantity of raw material readily available.

Endscrapers (n=11) were manufactured from non-local lithics (Knife River Flint [n=7] and Montana Chert [n=4]). Both recognized lithic types are very poorly represented in the debitage recovered; thus, it is assumed these tools were brought into Ross Glen as finished products (Figure 11). The presence of resharpening flakes indicates that some refurbishing of these implements occurred at the site.

A single broken specimen (#4514), presumably the proximal end of an endscraper (Figure 11:14), is longer than six of the complete specimens. Consequently, the recovered endscrapers are believed to have been exhausted through use and discarded as no longer functional. Ground

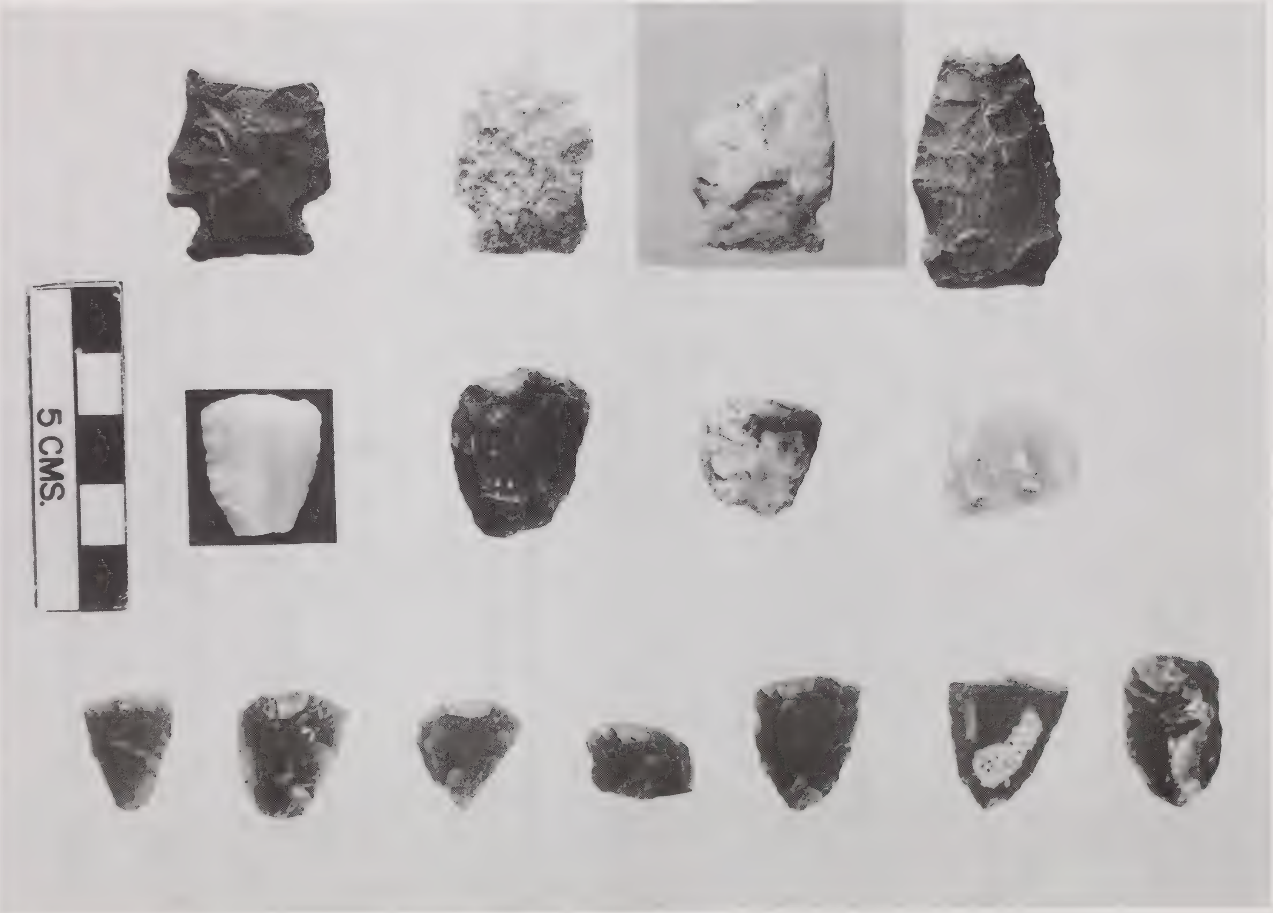


Figure 11: Besant projectile points 1 - 4 (674, 2625, 2626, 4866) and endscrapers 5 - 15 (4876, 2631, 2379, 4441, 1495, 1344, 3967, 1045, 2633, 4514, 4867) from 1978.

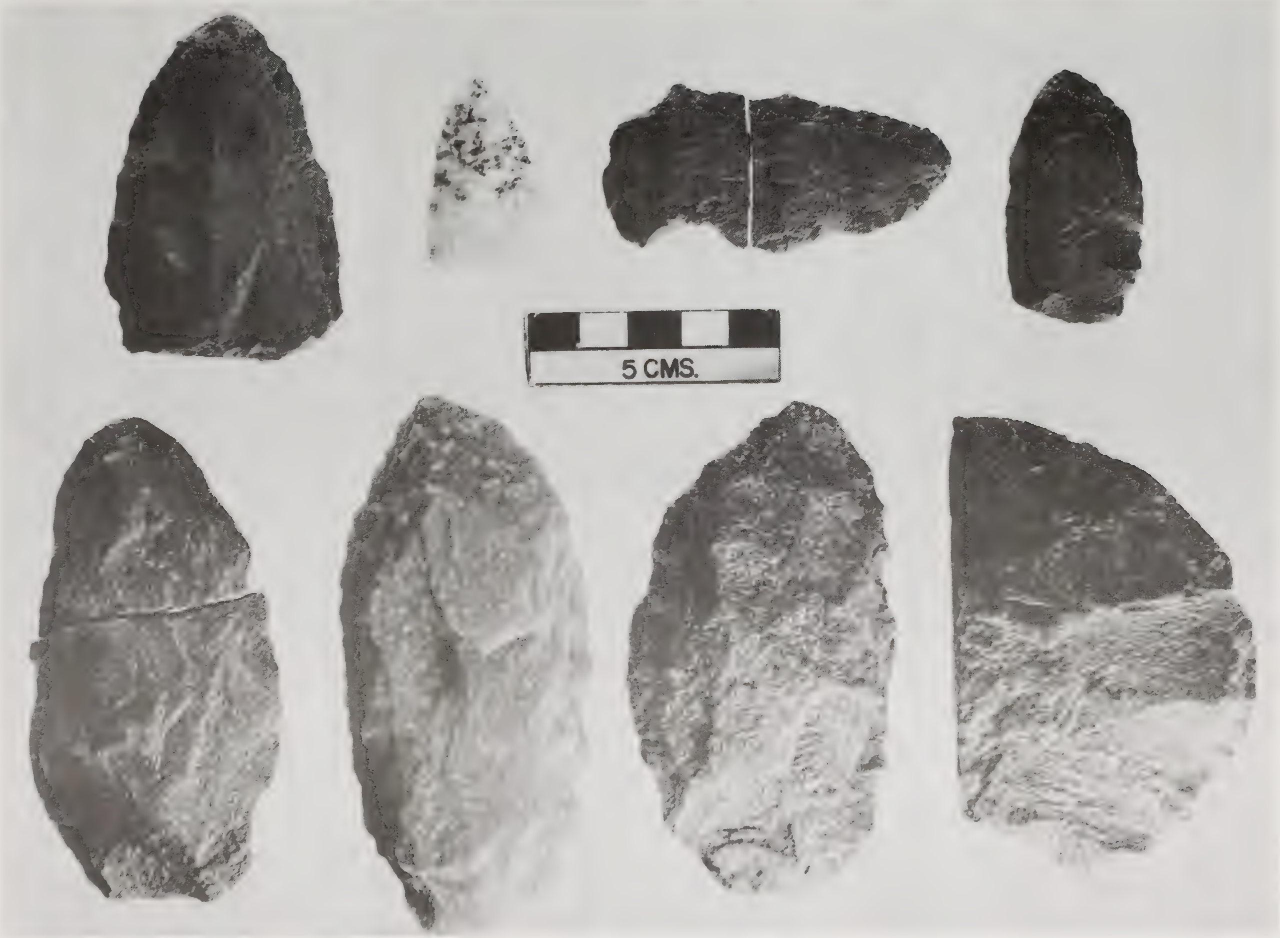


Figure 12: Besant bifaces from the 1978 assessment of Ross Glen (673, 3573, 3075, 3098, 4403/4402, 4872, 2634, 4870).

edges and polished bands along all scraper edges support the assumption that these tools were used to scrape hides. Four scrapers were found inside stone circles - two were adjacent to hearths and two were associated with piles of fire-broken rock. The remaining seven scrapers came from outside the rings.

4.3.5 Ancillary Features

Twenty-three features were identified and labeled as ancillary features. These included hearths, FBR piles, refuse piles, post molds, soil stains, knapping areas and small depressions (Table 8). They were located inside and immediately adjacent to stone circles or in open areas between the stone circles (Figure 13). These features suggest that a variety of cultural activities were conducted. Thus, they are classified into functional groups based on the frequency and types of material present. Most of these features were not excavated in 1978. The stripped portion of the site revealed seventeen features (Figure 13); six others were uncovered during our excavations. No features were observed on the undisturbed prairie surface. Features 1-3 and 18-23 were excavated in 1978 and form the basis for the classification groups and the interpretations.

The following paragraphs contain descriptions of the feature classification and discussions of the excavated features.

Refuse Piles

A wide range of cultural debris, including FBR, bone, lithics and broken tools, was present in these features. Their general shape was irregular, with poorly-defined boundaries in some instances. No evidence of staining or charcoal was found within these features, and the distribution of the cultural material within them showed no definable pattern or systematic placement.

Fire-Broken Rock (FBR) Piles

These features contained primarily rocks which had undergone intense heating - or heating followed by rapid cooling - resulting in fragmentation of the rock. Contents often included lithics or other cultural material but in much smaller amounts than the FBR. The size and

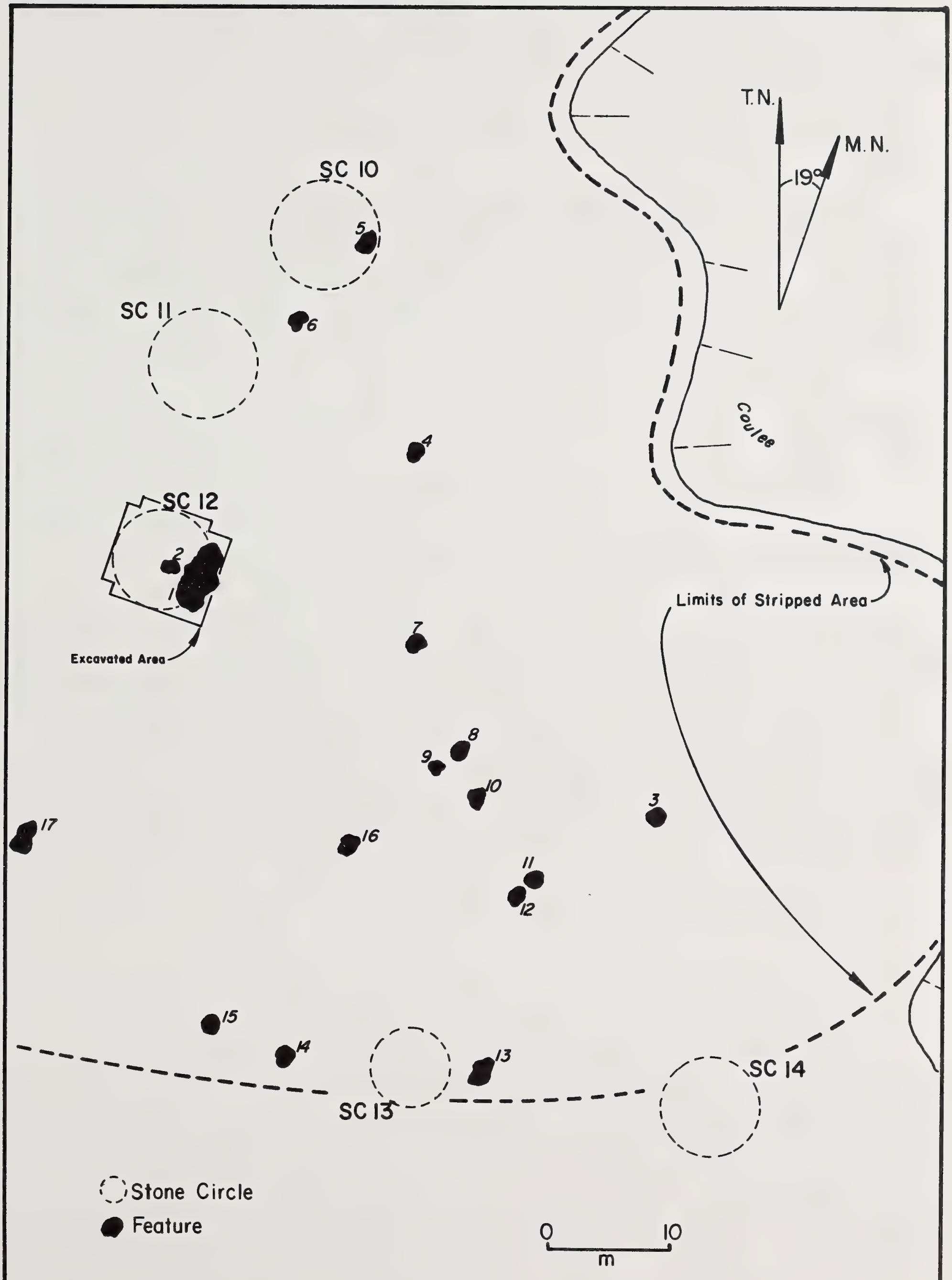


Figure 13: Location of ancillary features within stripped portion of DlOp 2.

shape of these features was quite variable. They were usually irregular in outline and showed irregular profiles. Again, there was little or no evidence of staining or charcoal.

Hearths

These were represented primarily by soil staining (black and/or orange) with small quantities of other cultural material in association. The latter varied considerably and was mixed with the stained soil. The hearths had definable boundaries and were roughly circular in outline. Two were excavated into the subsoil.

Boiling Pits

Generally, fire-broken rocks were concentrated in definable pits with signs of staining. In some instances, small quantities of bone and/or lithics were found in association.

Knapping Areas

Tool manufacturing was evident in these features. Large cobbles were split (Feature 21), or cores and cobbles were broken with the assistance of an anvil stone (Feature 22). Smaller waste lithics were found in association. These areas were irregular in shape, and precise boundaries were difficult to establish. No staining was evident.

Descriptions of Recorded Features

Feature 1 - Refuse Pile

Feature 1 was a massive and dense concentration of FBR, tools and lithic debris in an irregularly-shaped area. It measured 420 cm long, 150 cm wide, and varied from 7 to 11 cm in thickness. It was located on the eastern edge of Ring 12 (Figures 25 and 26). Because of the poorly defined boundary of the ring on that side, it cannot be precisely determined whether this feature was actually inside or outside the ring itself. It may have straddled the projected boundary of the ring.

A total of 1,919 pieces of FBR were recovered from this feature: 1,479 pieces (17.4 kg) were between 0 and 4 cm in diameter; 406 pieces (46.84 kg) were between 5 and 9 cm in diameter; and 34 pieces (15.70 kg) were greater than 10 cm in diameter. The lithic component of the feature is comprised of local quartzite (n=1140) and local argillites (n=505). The sample of stone tools includes six biface fragments (four pieces represent two broken specimens) and one endscraper found on the eastern edge of the feature.

The faunal material consists of very weathered and fragmentary long bones, probably of bison, weighing 30.52 grams. These were underneath the stone debris, which may explain why they were preserved. No burned or calcined bone fragments were recovered. The matrix of the feature consisted of mainly silt, with some sand and small (1 cm) pebbles. Due to the contents and location, this feature is interpreted as a refuse area from Ring 12.

Feature 2 - FBR Pile

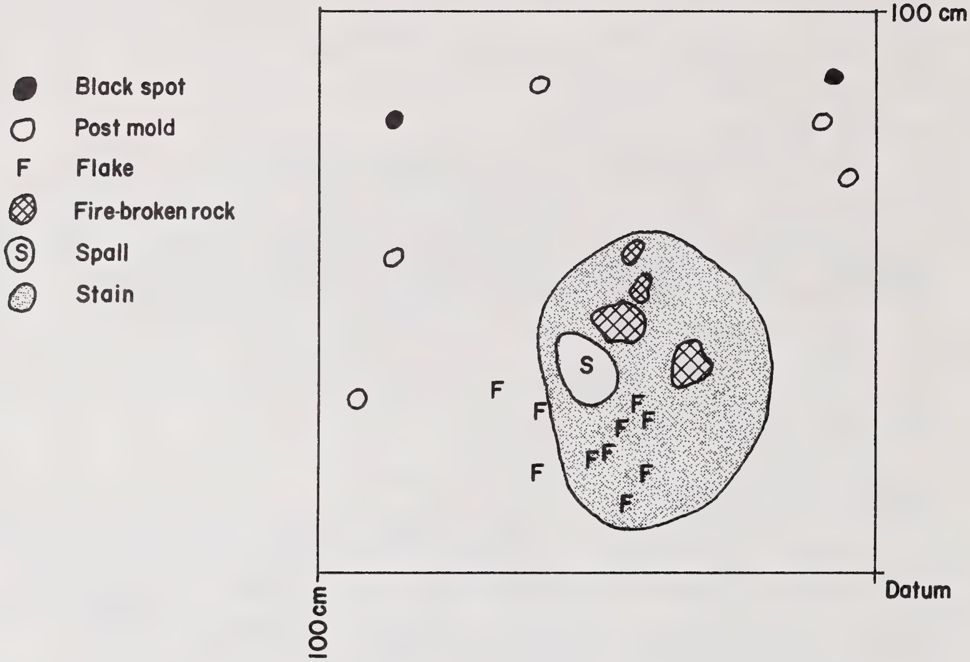
Feature 2 consists of a concentration of FBR and a few scattered lithics in an irregularly-shaped area (70 x 100 cm), 10-12 cm deep. It was found just east of the middle of Ring 12 (Figure 26), and just west of the edge of Feature 1.

The FBR (n=214) located in the feature is separated into the following size groups: 148 pieces (2.0 kg) between 0-4 cm in diameter; 58 pieces (7.0 kg) between 5-9 cm in diameter; and 8 pieces (4.75 kg) greater than 10 cm in diameter. Feature 2 is presumably a waste pile derived from cooking activities that took place inside Ring 12.

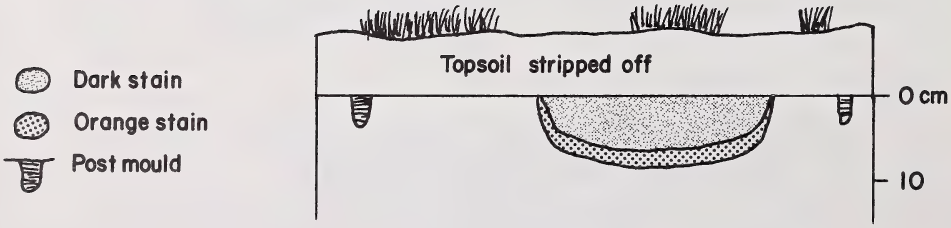
Feature 3 - Hearth

Feature 3 was a dark circular stain, 46 cm in diameter. It was excavated 9 cm downward into the surrounding matrix (Figure 14). In cross-section, it was slightly bucket to basin-shaped, with an orange stain approximately 2 cm wide outlining the black stain (Figures 14 and 15).

The hearth contained tiny calcined bone fragments (34.5 g), 122 small resharpening or thinning flakes, a single granular FBR split in five pieces, and one large, heat-treated spall. These were recovered in a matrix of silt and sand which was blackened as a result of a heating process.

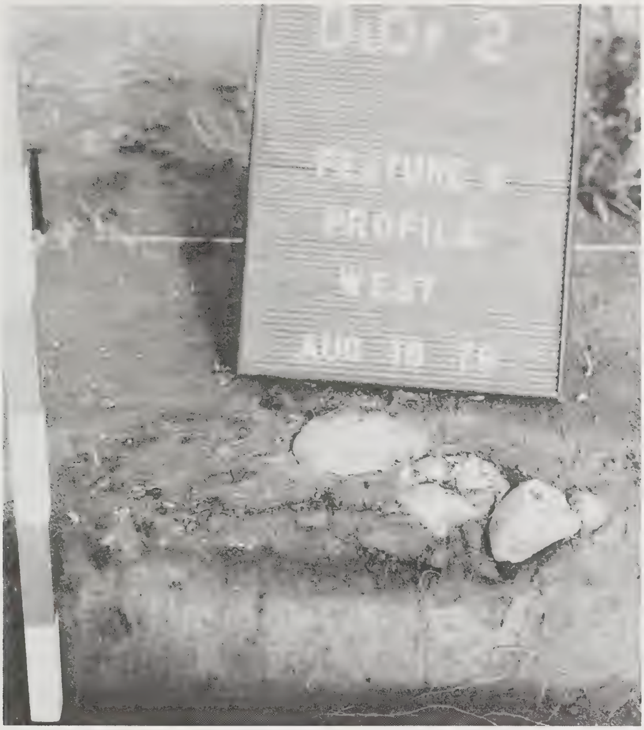


PLANVIEW



NORTH PROFILE OF HEARTH

Figure 14: Planview and profile of ancillary feature 3.



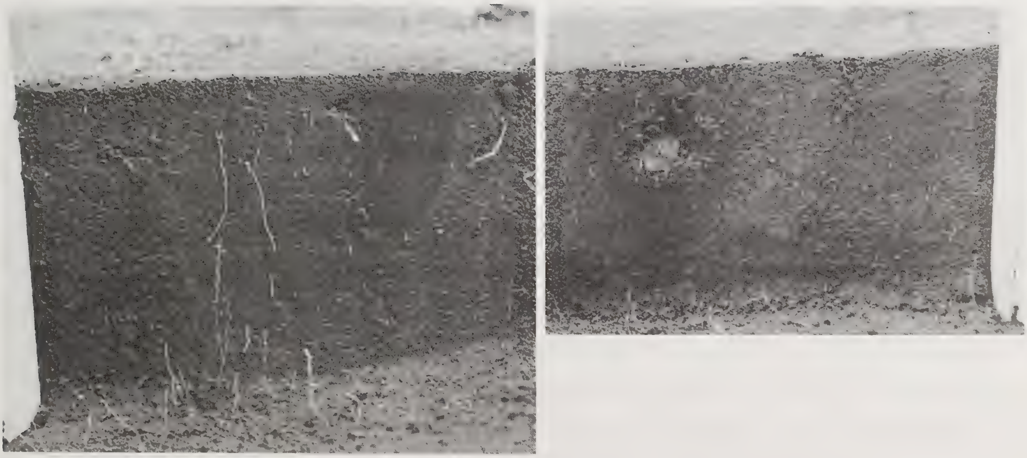


Figure 15: Profile of hearth and post molds at Ancillary Feature 3.

Twelve small post molds, forming a circular pattern, were discovered surrounding the hearth (Figure 14). They ranged in size from 2-3 cm in diameter and were 1-6 cm below the present surface. These were recognizable as pointed stains (Figure 15) and were probably a total of 4-10 cm deep prior to surface stripping in this area.

Feature 17 - Two Fire-Broken Rock Piles (Refuse Piles)

This feature was composed of two rock piles located 50 cm apart. The northernmost pile was 110 x 70 cm, while the southernmost was 70 x 60 cm. The FBR is composed of small- to medium-sized pieces. Two biface fragments (#4870 and #8509) were recovered within 70 cm south of the southernmost pile. These were located in the roadway that passes through the site. Further excavation could determine if these two piles comprise one massive feature.

Feature 18 - Hearth

This hearth feature was recognized as a black, roughly circular stain, approximately 40-35 cm in diameter, and 5-7 cm thick. Excavations revealed an irregular, shallow basin which was excavated downward just into the gravels. No FBR or bones were recovered, and only a minimum amount of charcoal was found. This feature was located outside and to the southeast of Ring 5.

Feature 19 - Hearth

This feature consisted of three, possibly related components: a hearth, a possible post mold and a small circular stain. The hearth was a very light stain which was carefully traced in two directions over an area measuring approximately 80 x 60 cm. It was 2-3 cm deep. A discontinuous and faint orange stain was observed in some areas below the black stain. A fragment or two of fire-broken rock, scattered pieces of calcined bone and flecks of charcoal were also recovered.

The second component of this feature was a stain shaped like a pointed stick, extending 3 cm into the ground, which was located approximately 12 cm east of the hearth. It was approximately 1 cm in diameter and may represent a small post mold.

The circular stain was 9 cm in diameter, 2-3 cm in depth and somewhat saucer-shaped in profile. It was located 20 cm east of the hearth.

Feature 20 - Two Black Stains

This feature consisted of two roughly circular black stains, 45 cm apart, located to the west of Ring 4. The smaller and easternmost stain was 17 x 15 cm in size and 3-4 cm deep. It was basin-shaped and dipped at an angle of approximately 60 degrees, terminating at the basal gravels. No ash, bone or lithics were recovered from this stain. A reddish tint was observed at the peripheral portion of this stain.

The larger basin-shaped stain, which measured 24 x 27 cm, was 10 cm deep and dipped at an angle of 45 degrees. It contained numerous small pebbles (1.5-3.0 cm in diameter) and a few flakes, but no bone or fire-broken rock. A large quartzite spall was found at the bottom of the stain. A small amount of charcoal was also recovered. The stain protruded into the basal gravels 4-5 cm and may have been a natural depression. This depression could have been caused by the removal of a stone.

Feature 21 - Core Concentration

This feature was roughly 100 x 100 cm and contained 10-12 split quartzite cobbles and cores and debitage. No patterning could be detected beyond the general clustering. These lithics were located on the west segment of Ring 5 and may be associated with the small depressions in Feature 23. A number of them seem to have been cobbles that were split and then discarded.

Feature 22 - Anvil/Cores

This anvil/core association consisted of a large (32 x 28 cm) gneiss stone, weighing 12-15 kg, with its long axis vertically oriented. This stone was set into place above the natural gravels and used as a platform upon which to split rocks. Five large, split cobbles or cores were found around the anvil (Figure 16) and were generally smashed on either end of their long axes. The anvil showed only two or three crushed areas on its upper end.

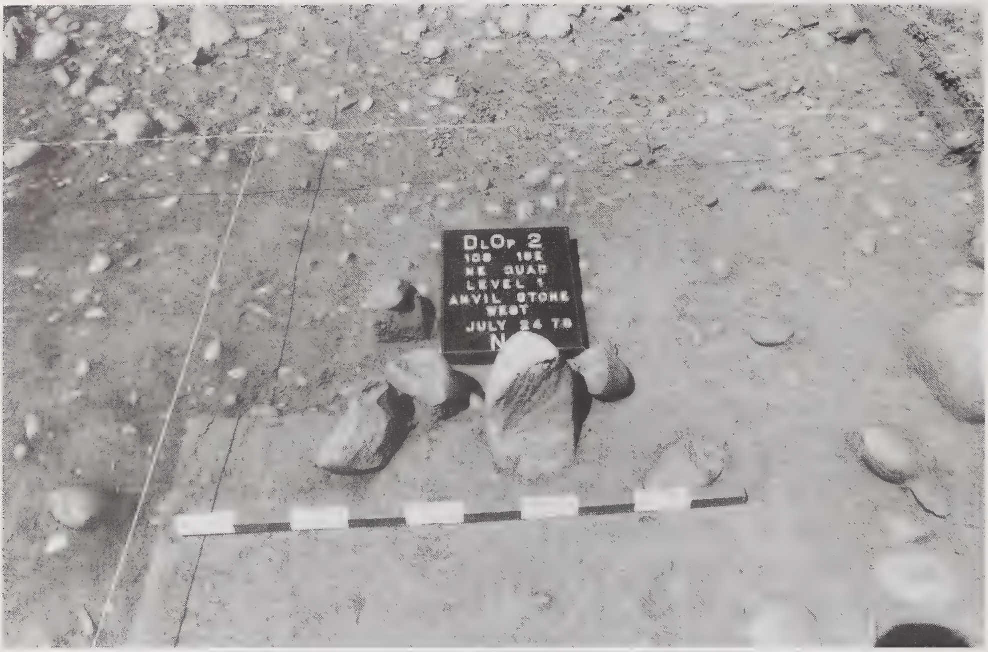


Figure 16: Upright anvil stone (Ancillary Feature 22) east of Stone Circle 5.

Feature 23 - Six Small Depressions

Six small (15-25 cm) depressions (Table 9) were noted in and around Ring 5 during excavation. Generally, these were oval in planview and basin-shaped in profile. Three contained lithics - 165 pieces in one of them. None of the depressions produced other types of cultural material or colored soil. It is believed that these depressions resulted from the removal of in situ cobbles. The depressions were clustered within 1.5 m of Feature 21, indicating that natural cobbles were removed and used as core material or in the construction of the ring.

4.3.5.1 Interpretations

Although not all ancillary features were excavated, and some may not have been discovered, their presence adds considerably to our knowledge of the site as a whole. As demonstrated earlier in reference to the ring features, the 23 ancillary features can be construed as representing a single time unit. This provides an excellent opportunity to interpret types and locations of various camp activities and to make inferences concerning the inhabitants.

By placing these features into various categories, I have taken an initial step in interpretation. The refuse piles were just that - areas where a wide variety of camp debris was deposited. These correspond to features commonly termed "trash piles" or "middens." In this instance, the contents undoubtedly do not relate to a single task but rather to a multitude of activities which produced various types of by-products eventually accumulated in a specific locality. The types of cultural materials found in these associations would lead one to assume that the length of occupation was somewhat longer than a brief one to three day stay. Since the amount of refuse accumulation obviously indicates cleaning of areas and discarding of refuse, the occupants are presumed to have been there long enough to accumulate the refuse. This would tend to imply continued utilization of specific areas (e.g., the inside of a tipi) over a period of time. Feature 1 is an excellent example, both by its location and its contents.

The fire-broken rock piles also suggest a lengthy stay, although the evidence is not as obvious. Since FBR is interpreted as a by-product of a heating and rapid cooling process, the piles are assumed to represent single-task operations in that the contents were discarded as a unit from a task-specific activity. This generally can be related to cooking and/or preparation of bone grease, which also implies sufficient time to hunt, kill and butcher the game prior to processing. Considerable ethnographic evidence of bone grease preparation exists in the literature (e.g., Mandelbaum 1940:193; Leechman 1951:355; and Zierhut 1967:35).

Generally, the identified hearths relate to one or more of the following activities: heating, food preparation, insect smudges, lighting, or smoke production for meat processing or hide preparation. In many instances, there is evidence of associated activities at the hearths, such as post molds, which may imply a structure over the fire. In other instances, charcoal in the matrix may imply the type of fuel utilized. Ethnographically, we learn that certain fuel types have been used for specific purposes. Thus, the identification of fuel is important. We cannot assume that only one type of fuel was used, for it is known that wood, dung and grass were all utilized. However, this site, like many others, is exposed to heavy winds and other environmental conditions which make preservation and/or identification of the fuel impossible. Consequently, our ability to date and interpret these features is restricted.

Although a number of stains were recorded, only two (Ancillary Feature 20) were examined through excavation. The limited cultural material found in association with these stains provided little or no evidence of their possible function. Since the stains had definable boundaries and had specific shapes, I tend to believe that they were in fact hearths, although the lack of other cultural material is puzzling.

The two discrete knapping activity areas provide evidence which suggests that the remains of a general cobble reduction process and/or the initial evaluation of internal stone texture and quality. Given the number and exposed nature of the gravels on the site, it appears that the inhabitants utilized this nearby material as their source.

One ancillary feature which warrants specific mention is Feature 3. This hearth was truly informative, yielding bone, lithics and small post molds in direct association. This combination could have functioned as a facility for hide smoking and tanning, with the hearth representing a smudge pit and the post molds being the result of the hide-supporting structure. Lowie, when discussing the skin dressing for the Crow, states:

> Buffalo hides were not smoked, but those of deer and elk might be. In this case a pit was made in the ground and rotten wood, e.g. of the willow, was used to build a fire in it. Over the hole a small sweatlodge sort of structure was erected and the sewed-up deerskin was laid over it and staked down so that the smoke could not escape (1922:217).

Binford (1967:12) and Dyck (1977:157-262) have also provided archaeological and ethnographic evidence for the interpretation of this process. Their descriptions and discussions characterize structures almost identical to that of Feature 3. Oxbow components (ca. 3,000-1,500 B.C.) at the Harder site (Dyck 1977:64-67) in Saskatchewan have very similar features which were also interpreted as smudge pits.

If we accept this interpretation, we then have further evidence of animals being killed and hides being processed. I suggest again that this activity takes considerable time to accomplish, thereby substantiating a lengthy stay at this site. The smoked hides would probably be used in making clothing and/or lodge covers.

In examining the overall distribution of the stone rings and the ancillary features, we see a concentration of the latter between the two suggested groups of rings. Although some of the hearths, stains and refuse piles were associated with individual rings, a sizeable number of ancillary features were situated between the two groups of rings. The identified hide-smoking feature lies in a sandy area away from the rings. I suggest that the area between the rings was jointly utilized by inhabitants from both groups of rings. This area could have contained specific activities that required more space: staking out hides for drying, joint tasks such as butchering animals, or activities requiring softer ground such as pit excavation. The area between ring groupings A and B would have been a suitable area for a wide variety of activities.

4.3.6 Circular Stone Features

A total of eighteen stone circle features were identified, mapped (Figures 17-23) and analyzed; two were completely excavated and two others were tested (Figures 24-27). These stone configurations were constructed of naturally rounded cobbles, lying partially buried in the soil. Most stones were approximately three-quarters buried, with the exception of one ring (#20) in which all stones were totally buried and were revealed only following the shallow blading of a road across the south end of the site (Figure 25). Stone circles are the most prominent features at D10p-2. A series of detailed stone circle analyses provides the basis for the interpretations.

4.3.6.1 Depth

The initial and most critical question, that of contemporaneity among the eighteen features, was examined through the analysis of the rings depth and size. Depth measurements were recorded on every observable stone in each ring, which provided an average depth per ring (Table 10). Rings 16 and 17 were found to be much shallower than the others, and a statistical test was employed to determine the significance of this difference.

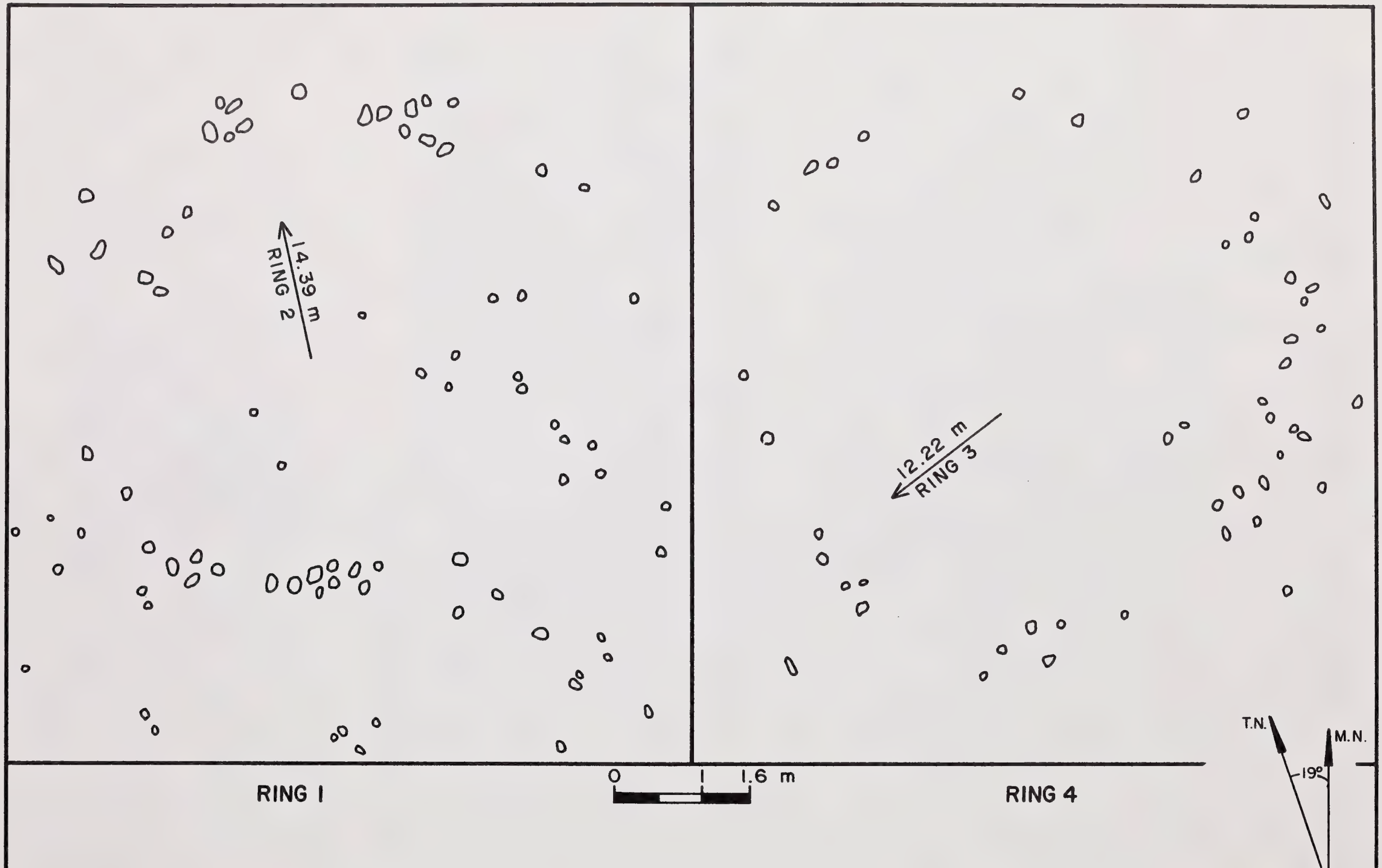


Figure 17: Stone circles I and 4, DlOp 2.

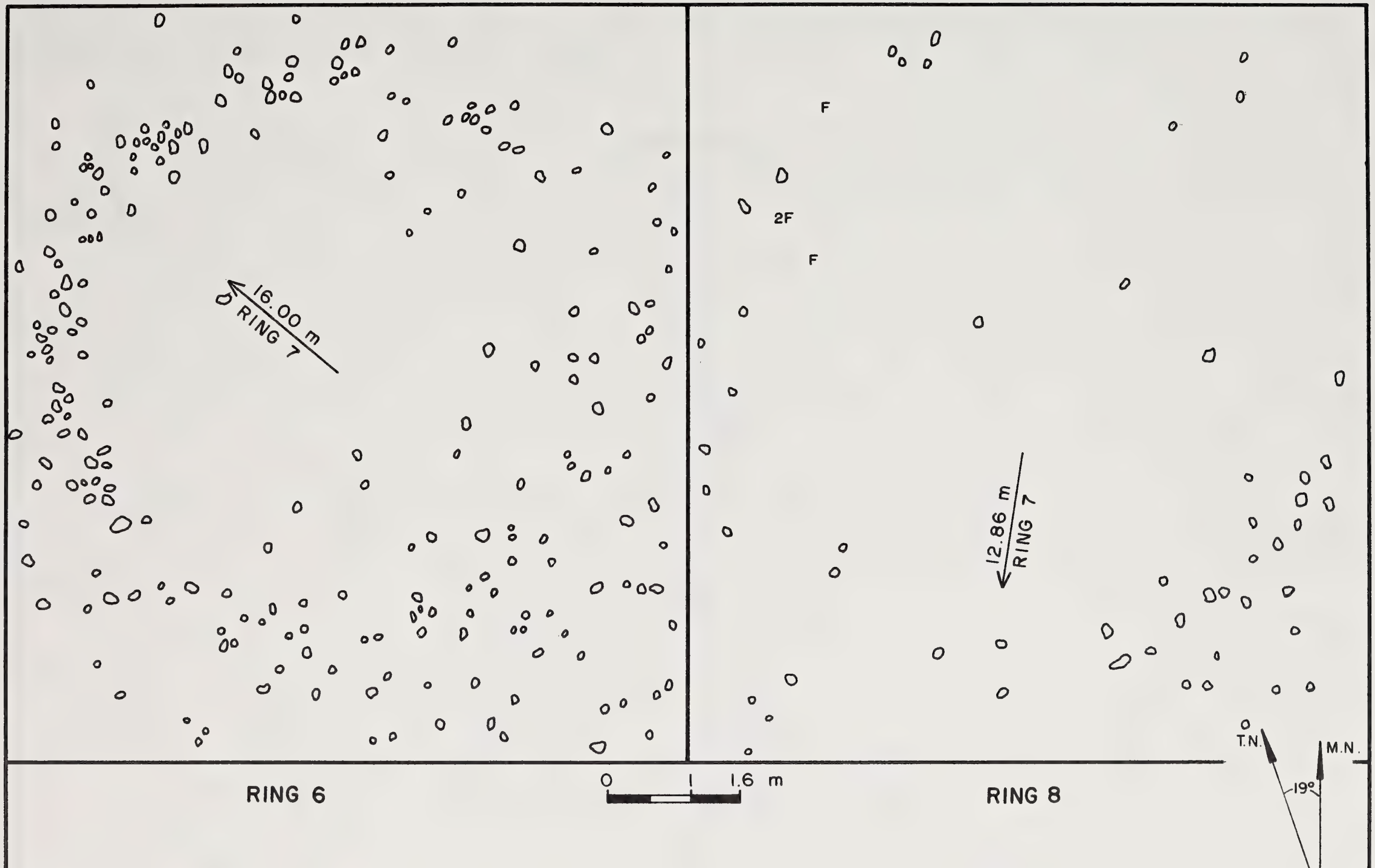


Figure 18: Stone circles 6 and 8, DIOp 2.

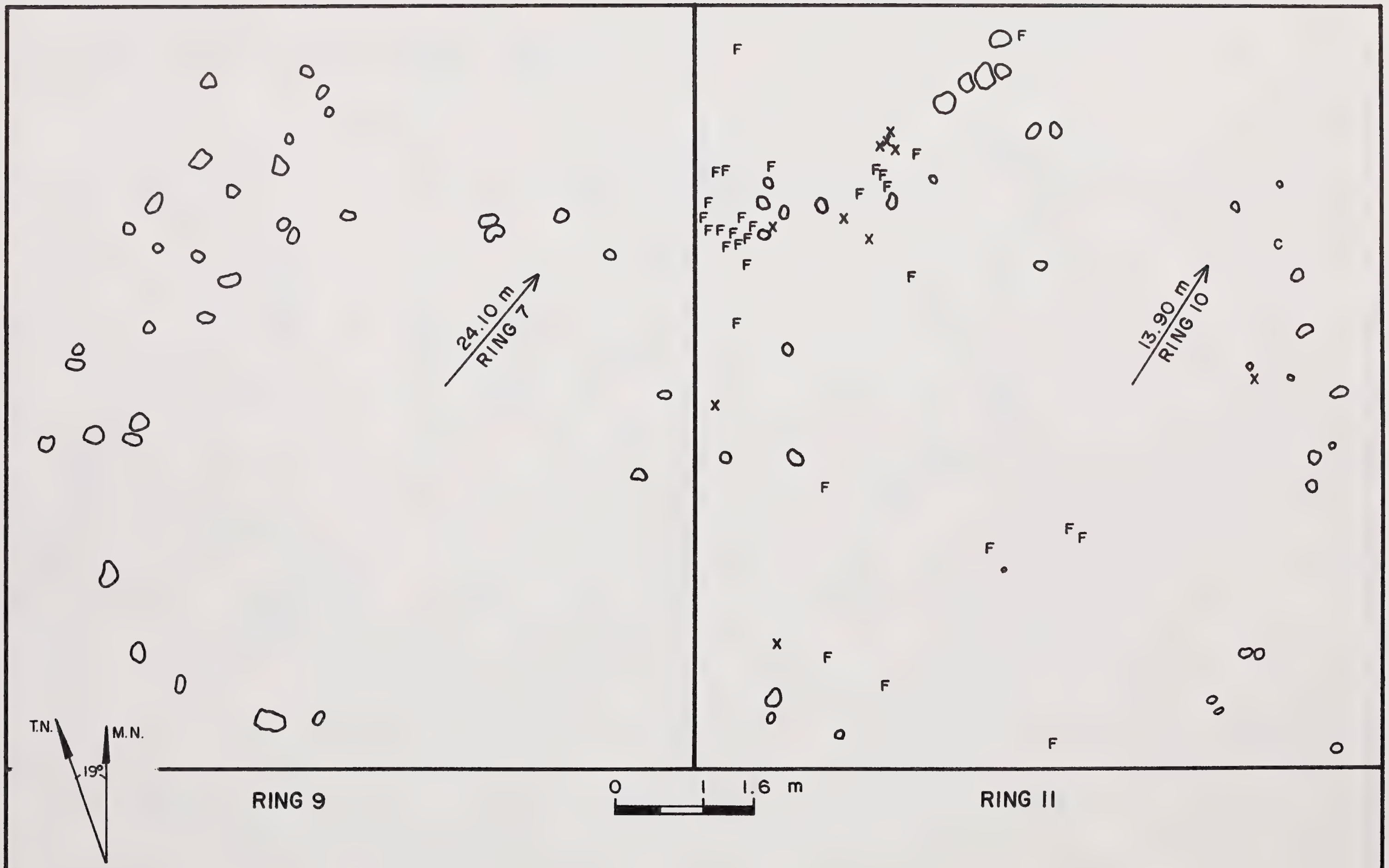


Figure 19: Stone circles 9 and 11, DIOp 2.

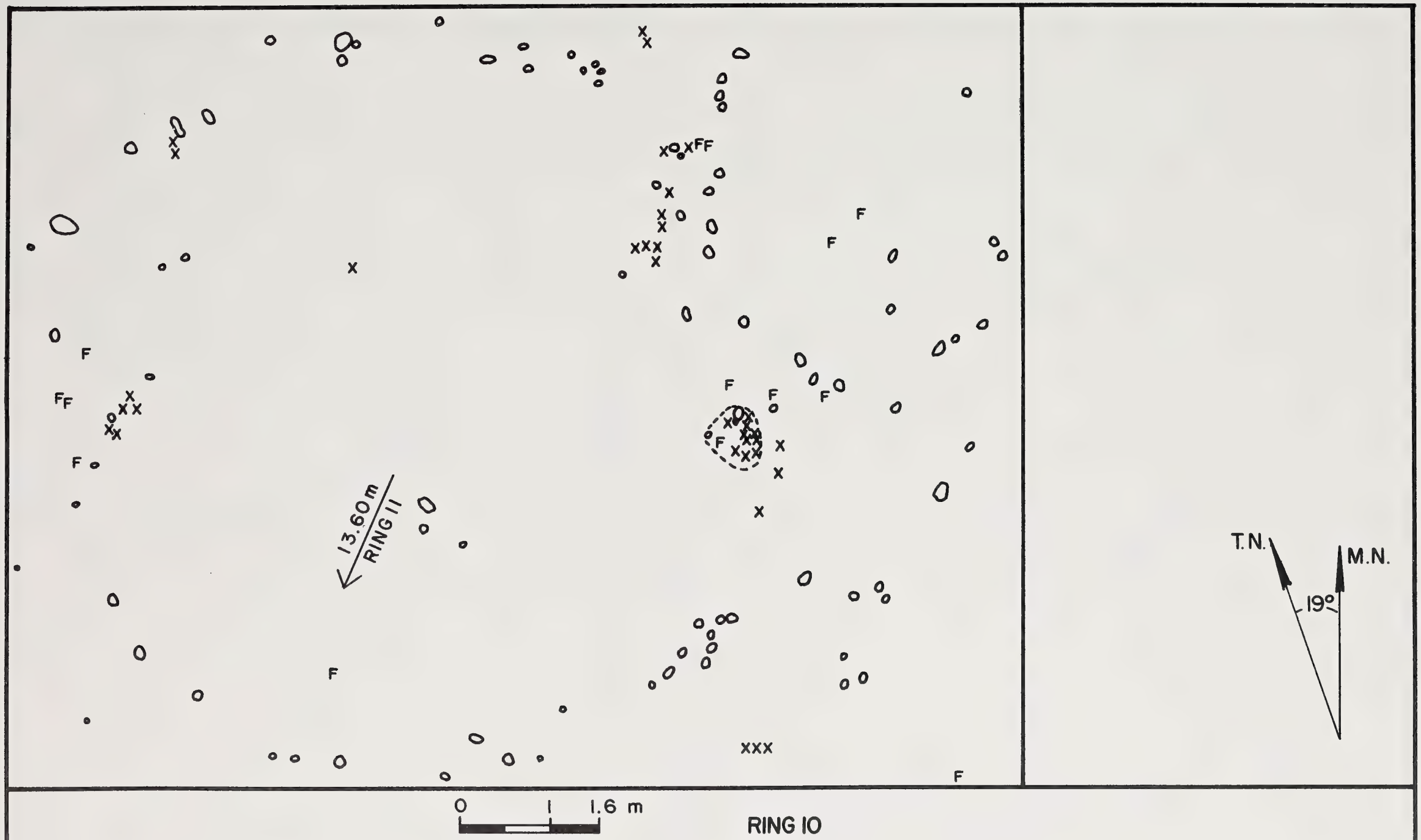


Figure 20: Stone circle 10, DlOp 2.

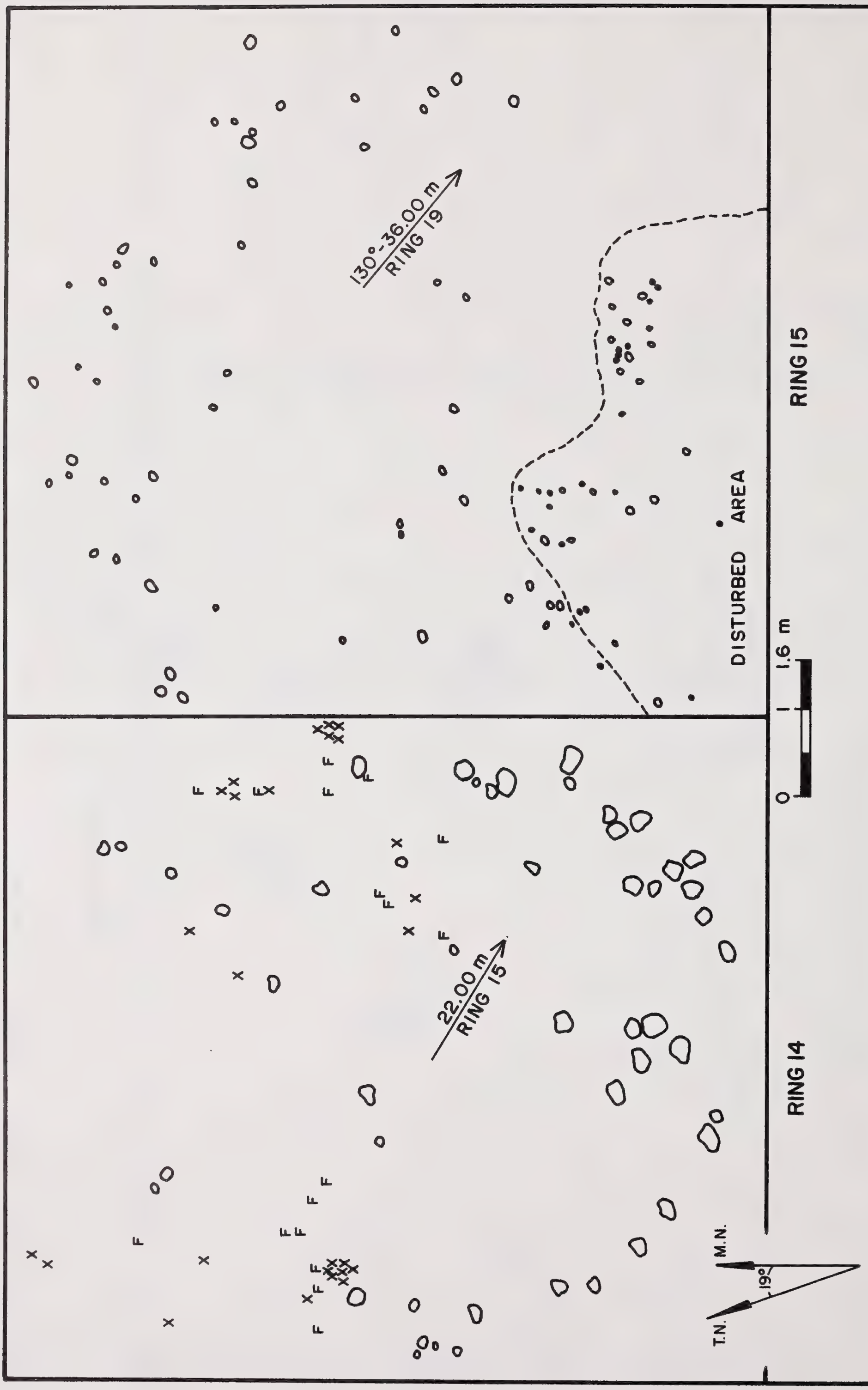


Figure 21: Stone circles 14 and 15, DlOp 2.

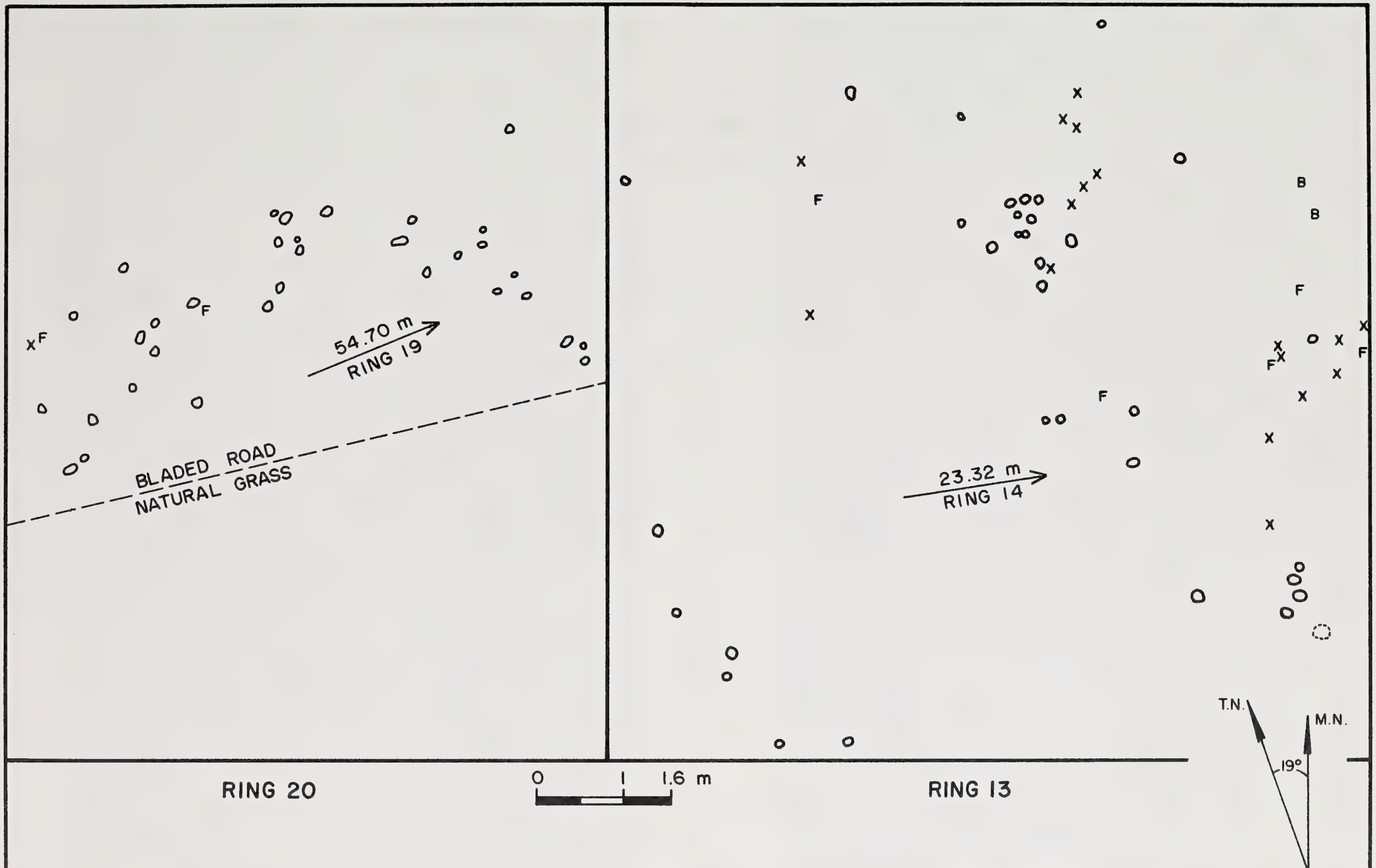


Figure 22: Stone circles 13 and 20, D10p 2.

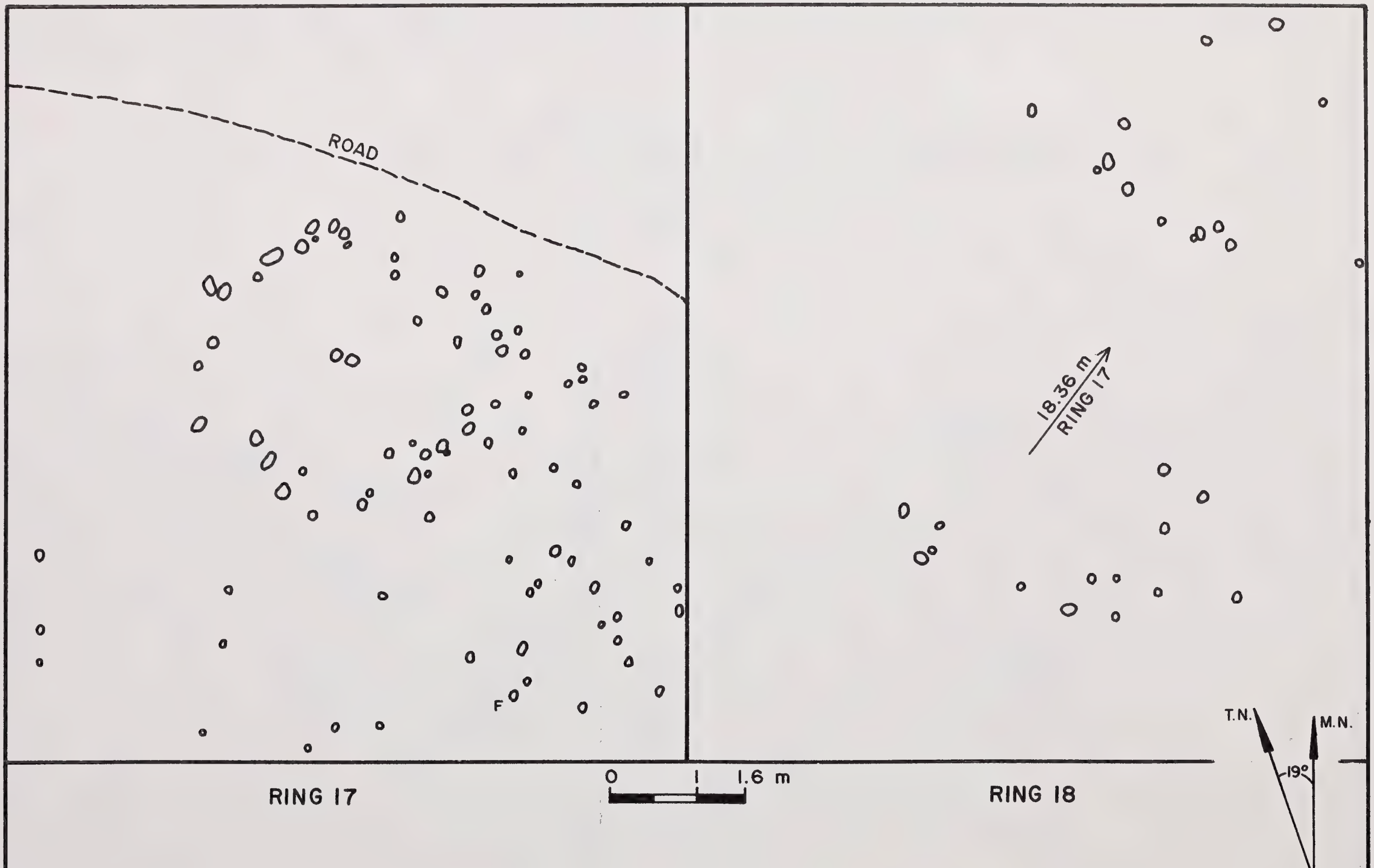


Figure 23: Stone circle 17 and 18, DIOp 2.

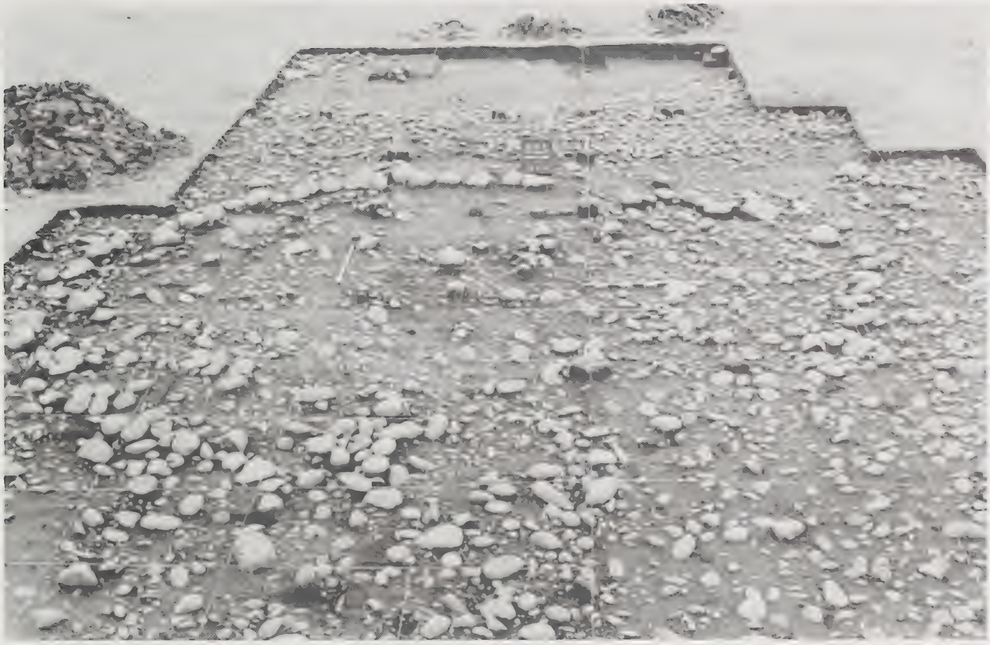


Figure 24: Stone Circle 5 completely excavated in 1978.

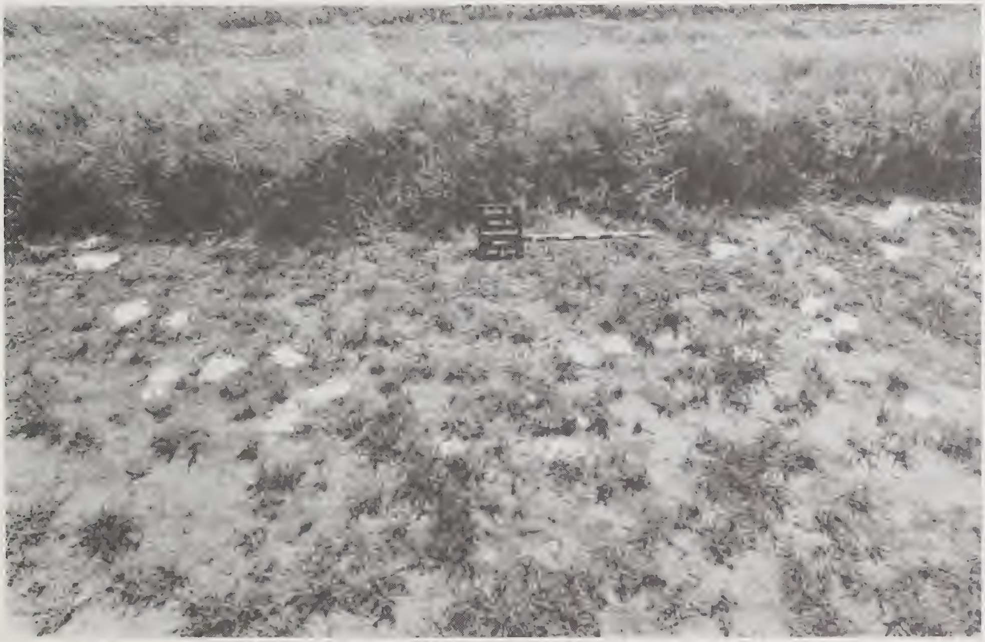


Figure 25: Stone Circle 20 one-half buried.

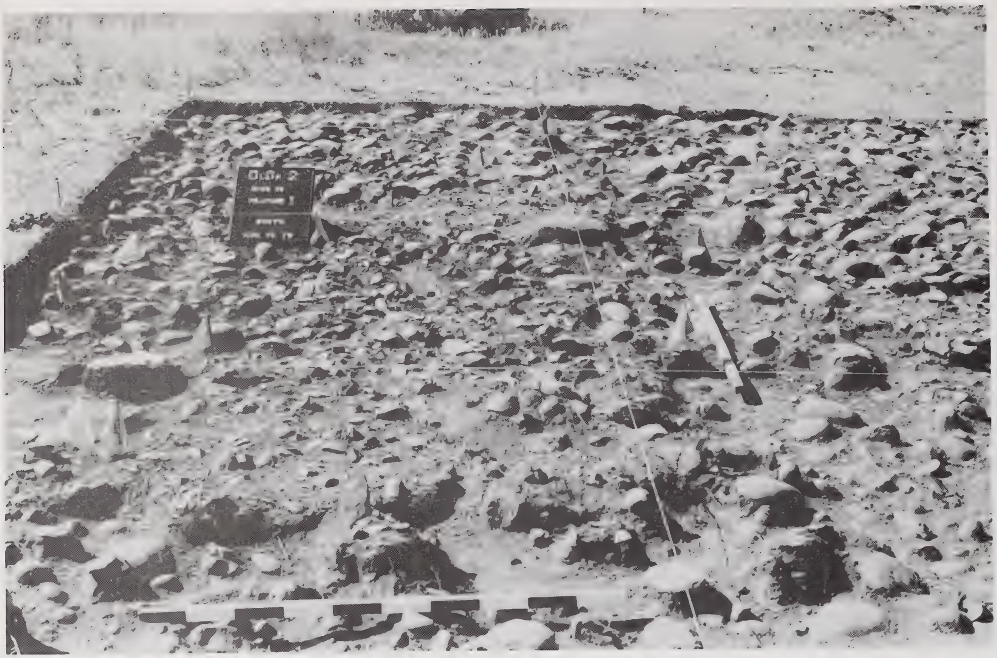


Figure 26: Ancillary Feature 1 (refuse pile) on east side of Stone Circle 12.

Figure 27: Stone Circle 11 as it appeared from the surface.

A t-test (t=4.35, df=17, $p < 0.005$) between the measured depths of Rings 16 and 17 and the remaining stone circles indicates that there is indeed a statistically significant depth difference between these two groups. The differences in depths - a mean of 8.17 cm for Rings 16 and 17 in comparison to a mean of 13.34 cm for all others - indicates that these stone circles are derived from separate populations and perhaps, by extension, they do not date to the same time period.

4.3.6.2 Size

The stone circles at Ross Glen are not perfect circles; thus, east-west and north-south measurements were recorded in an attempt to standardize the measurement and in order to establish an average size for each feature. Since these stones are assumed to represent weights used to hold down the bottom edges of tipis (Kehoe 1960), the inside diameter is deemed the most appropriate size measurement (Table 10, Figure 28). The inside diameter measurements ranged from 3.0 to 8.0 m, with mean of 6.24 m and a standard deviation of 1.35 m. Plotting the average inside diameters against the rings' areas (Figure 29) demonstrated an obvious separation between Rings 16 and 17 and the other stone circles. The difference in mean diameters was explored using a t-test between the two possible groups. Results (t=10.39, df=17, p=0.005) indicate that the difference between the two groups is statistically significant. Also, Rings 16 and 17 are significantly smaller in mean diameter (3.2 m) than the remaining 16 rings (6.63 m).

Considered collectively, the evidence presented on the depth of the stones in the rings and the inside diameter measurements, leads to the conclusion that Rings 16 and 17 are significantly different from the others (Figure 29). Unfortunately, the nature of this difference remains unclear, since these two rings were not excavated in 1978. Employing a series of t-tests on the ring diameters in the main group, the author concludes the rings were constructed in two major sizes, averaging 7.55 m in diameter for the larger rings and 5.5 m for the smaller.

4.3.6.3 Weight

To explore the possibility of construction differences, the individual weights of stones at every ring were recorded; Table 10

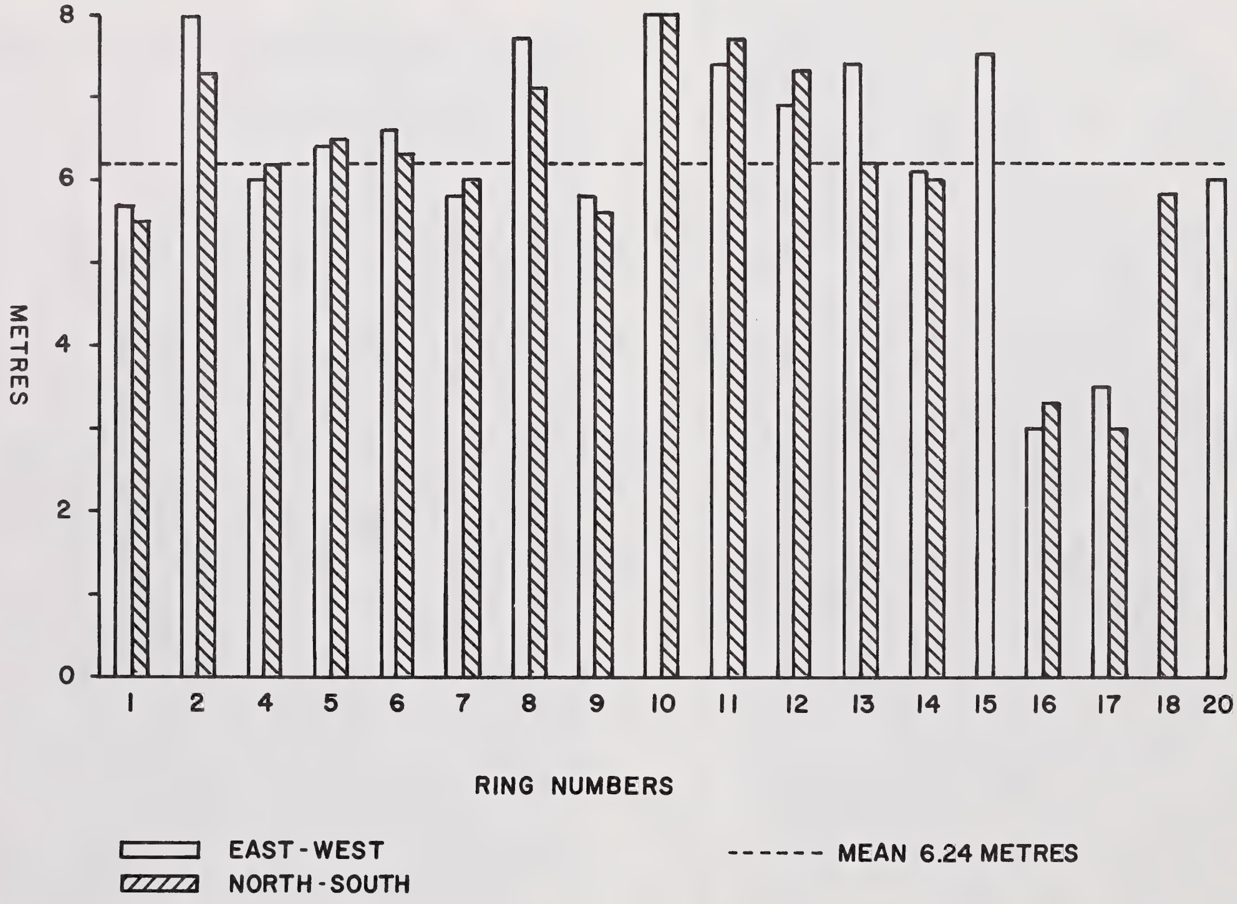


Figure 28: Inside diameters from stone circles, DIOp 2.

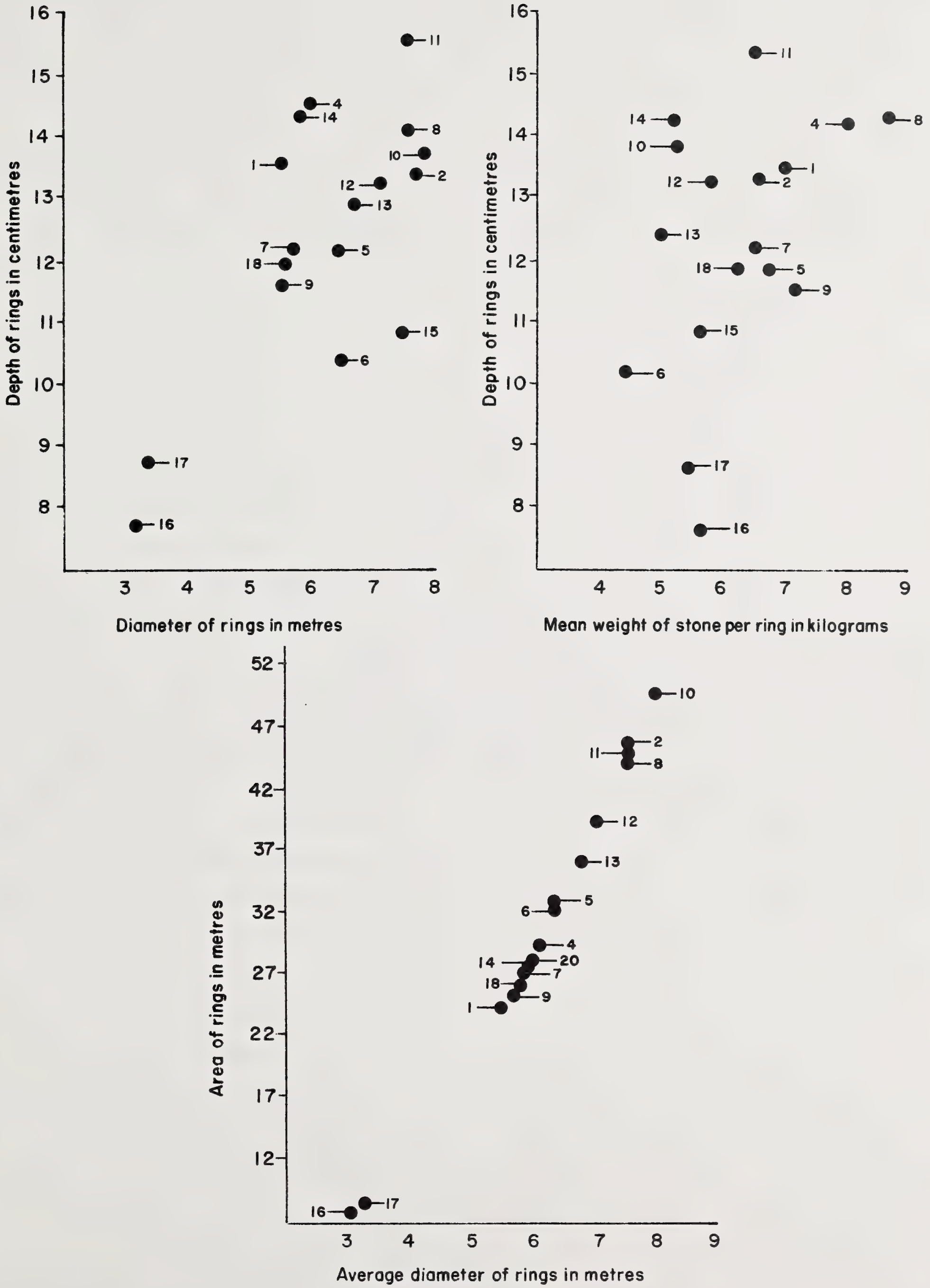


Figure 29: Analysis of stone circle characteristics.

displays the results. The large and small rings, sorted by diameter into two groups, do not differ significantly from one another with respect to minimum, maximum and mean rock weight as tested with the student's t distribution. Even though there are ring size variations, the builders utilized rocks of similar weights and variations to construct both the large and small rings. The average weight of rocks employed in ring construction was 6.4 kg, with only 1.33 kg variation among rocks.

4.3.6.4 Configuration

The positioning and the number of rocks in these alignments indicate the gross configuration as observed from the surface (Figures 17-23). Completeness has usually been assumed in discussing these alignments, although there is no way of determining which openings were culturally constructed and which may have been created by dismantling or subsequent disturbances. This difficulty was compounded by the quantity and location of the natural basal gravels under many of the rings.

In general, the eighteen rings were oval, and each was constructed of a single stone line. They vary from well-defined circular configurations (Ring 2) to more scattered, ill-defined patterns as in Ring 13. The number of rocks per ring range from 19 in a partial ring to 132 in a complete ring, with a mean for all rings of 51.59 and a standard deviation of 32.38. These figures have little meaning, however, since we do not know whether all the rings were complete and what their original sizes may have been. Table 10 provides information on the number of rocks per metre of circumference. These figures take into account some of the variables mentioned above, in order to aid in understanding the variations among the rings.

In examining the plan views of the rings, there are no obvious concentrations or groups of rocks, no consistent clustering of rocks to one particular side, and no obvious gaps which could be interpreted as doorways. In two instances (Ring 6 and 7), rings were constructed immediately upon the glacial gravels and it appears that rocks were removed from the central area and incorporated into the circular configuration. Rocks were also gathered from one to two metres distance around the ring and added to the northwest half of Ring 6. I interpret this observation as an indication that the rings were constructed with minimal effort because many of the rocks were not transported more than a metre or two. It also resulted in the culturally-placed stones being left at a higher level in the soil profile than those of the other rings. It cannot be determined if rocks from the center of the ring were moved prior to the erection of the structure or afterward. Rings 6 and 7 are located in the area where the glacial gravels are most prevalent. The gravels are exposed on the surface toward the north end of the site and along the western side of the road as far south as Rings 1 and 2, but there are virtually no surface gravels to the south or east of Rings 11 and 12. The rings on the southern end had the fewest number of rocks, and the mean weight of rocks for those rings is also less than that of rings in the gravel area (Table 10). The amount of effort involved in moving rocks appears to have played a direct role in determining the number of stones found in the rings.

4.3.6.5 Spatial Patterning

The distribution of ring features in the Ross Glen site (Figures 2 and 3) was investigated by means of nearest neighbour analysis (Rings 16 and 17 were not incorporated in the following analysis as they were assumed to represent a separate occupation). Since two size categories of rings have been established, an analysis of the distance between large and small rings was undertaken to determine if different patterns were present. The first series of analyses consisted of an F-test to determine if the distribution of these two sizes was different based on nearest neighbour data. The tests indicated that the distribution of rings by size was non-random (F=4.89; df=68; p=0.05; F-31.62; df=68; p=0.005; F=6.10; df=6.6; p=0.05).

A number of t-tests were then performed to determine if the various combinations of large and small rings were statistically different in distribution from one another. The results of this analysis were negative (t=0.062, df=14, p=0.05; t=0.95, df=14, p=0.05; t=1.01, df=12, p=0.05). From this, I concluded that the large/small ring association was not the basis for the significant F-tests and that some other kind of relationship was responsible for the lack of randomness in these features. The possibility of ring groupings was then raised as a potential explanation for the lack of randomness. This led to the division of the sixteen rings into groups based on the nearest neighbour measure within the logical group and a measure of the nearest neighbour to the adjacent group. Groups analyzed were Rings 1 and 2; Rings 4, 5, 6, 7, 8 and 9; Rings 10, 11 and 12; Rings 13, 14 and 15; Ring 18; and Ring 20 (Figure 30). The statistical results supported the idea of group clustering among the rings with differences between ingroup and outgroup generally around the 0.005 level of significance (e.g., Group B t=18, df=26, p=0.005). Four groups were isolated (A1, B1, B2 and B3) with two single rings (18 and 20). Further analysis of the groups revealed two major clusters of rings - A and B - with the subgroups forming the major groups (Figure 30).

4.3.6.6 Stone Circle Excavations

Two stone circles were completely excavated (Rings 5 and 12), while two others were subjected to limited excavations. A discussion of each of the two completely excavated rings is given below.

Stone Circle 5 was located in natural prairie, with stones spaced in a single row for approximately three-quarters of a circle (Figure 8). A total of 126 square metres were excavated inside and immediately adjacent to the ring, with 36 square metres constituting the inside of the ring (Figure 24). Material associated with this stone circle was quite plentiful (Table 11). There was three times (39.5 versus 11.9/square metre) the number of FBR inside the ring as outside it. The lithics also showed considerably higher frequencies inside than outside (66.7 versus 35.5/square metre). These figures also demonstrate the large quantity of lithics in and around this stone circle. Specific data on the ring stones are presented in Tables 12 and 13.

Although no Besant projectile points were recovered, the pattern of FBR distribution toward the northeast corner (Figure 5), the Knife River Flint endscrapers, central hearth and post mold, quartzite biface, and depth of stone burial are supportive of Besant affiliation.

Stone Circle 12, located in the stripped area of the site, underwent the excavation of 68 square metres. The circle consisted of a few widely spaced stones (Figure 10; Tables 15 and 16) in an oval pattern. The entire ring was excavated (41 square metres), with the immediate outside margin also excavated (27 square metres). The FBR was nearly equally

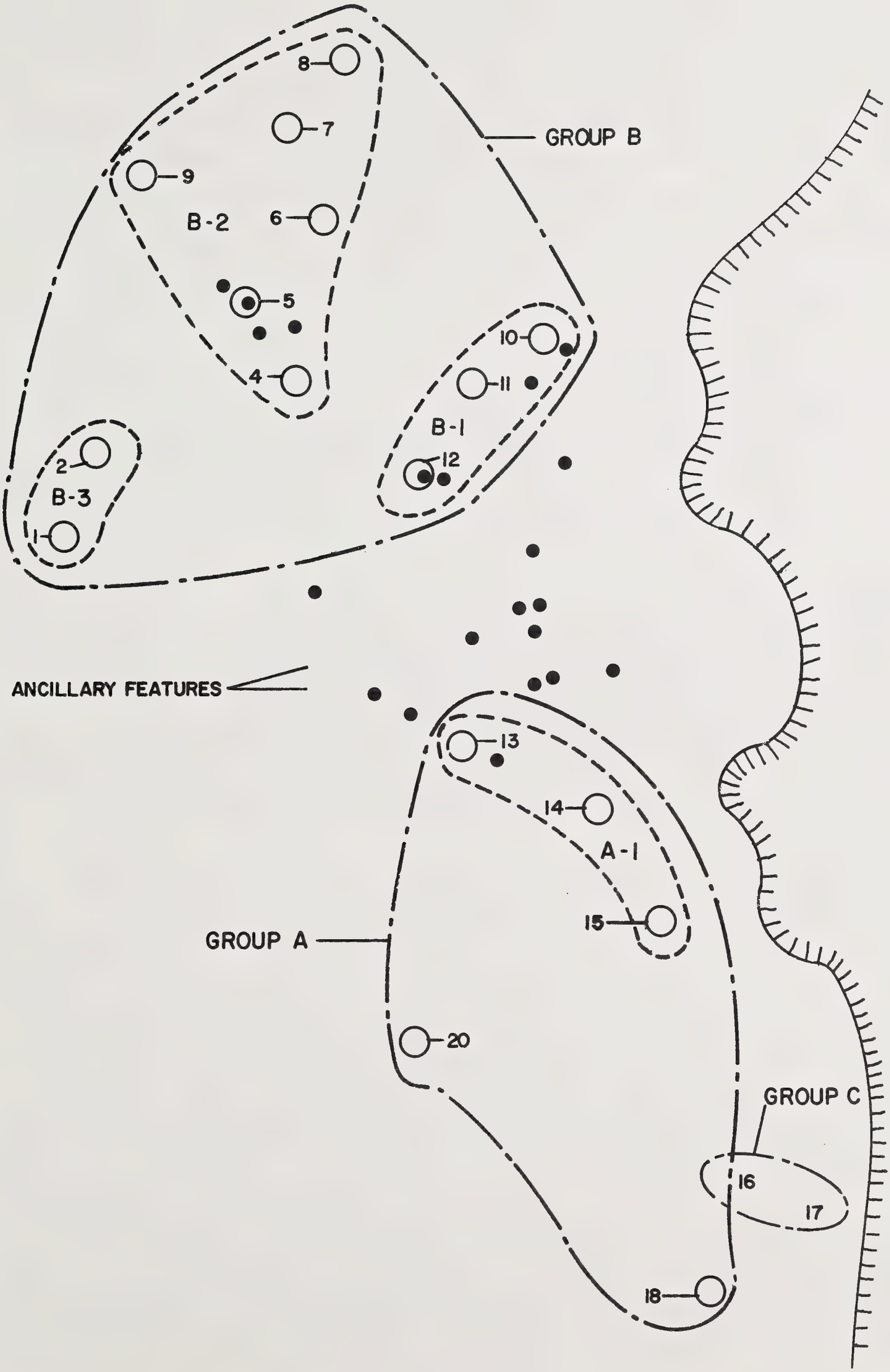


Figure 30: Grouping of stone circles based on analysis .

distributed in number and in weight inside (10.9/0.83 kg per square metre) and outside (12.9/0.73 kg per square metre) the ring. Lithic debitage was twice as dense inside (36.2/square metre) as outside (26.7/square metre), which was the same as for Ring 5. Material found associated with this stone circle is shown in Table 14. An important feature noted in Ring 12 was the large (1 x 3 m) refuse pile straddling the eastern boundary of the ring (Figure 26). It could not be determined if the feature was inside or outside the ring. The frequencies of lithics (560/square metre) and FBR (432/square metre) within this feature were quite considerable in comparison with the rest of the excavations.

Although a projectile point was recovered inside the ring, the base was missing and consequently it was not classifiable. However, the endscrapers and bifaces were similar to others at the site, and therefore the ring was thought to be associated with the Besant phase.

4.3.6.7 Discussion

The findings from the Ross Glen site shed further doubt (Quigg 1981a:59) on Kehoe's (1960) view that ring sizes become larger through time. Given that we have a major camp of at least sixteen contemporaneous rings, and that both small and large rings are present, it follows that the size of rings is not indicative of various occupations through time.

I suggest the most reasonable explanation of the range in sizes within one group would be social and/or economic differences among individuals and/or families within the camp. In subsistence economies, family size is often correlated directly with wealth and/or status, and differences in family size could account for the differences in ring sizes at Ross Glen. Further indication that these groupings represent family or small band isolates can be found in historic accounts such as the following:

> The same positions with relation to each other were occupied by lodges at each of the camps. Near relatives set up their teepees side by side, groups were made up of related families (quote of Thomas H. Leforge, a Crow Indian, as told by Marquis 1928:148).

Henry (1897:382), in describing a Cheyenne camp of 120 lodges, states: "... beside each large tent was a small one," which he interpreted as a cut-down structure and then went on to say, "... such tents appear to be for women's necessary occupations such as cooking, preparing meat, dressing leather, etc." Ewers (1955:131) also states that the primary factor determining lodge size was the wealth of the occupants.

The two major divisions detected (A and B) could represent two separate bands occupying the site at the same time, possibly as a seasonal amalgamation for communal hunting purposes. Ewers states:

> Surrounding or impounding of buffalo by footmen could not have been successfully accomplished by camps composed of relatively small family groups. The cooperative hunt necessitated a band or village organization of 10 or preferably more lodges (1955:303).

Ross Glen certainly fulfills the latter in that there was evidence of at least sixteen lodges in the main group. Using a rough estimate of six persons to a lodge (Frison 1978:238), we find that the site may have been occupied by nearly 100 individuals. Undoubtedly, this is a conservative estimate, but it suggests that there were probably enough males to undertake and complete a successful kill operation.

5.0 PROPOSED DEVELOPMENTS

The proposed housing subdivision plan calls for the development of 505 dwelling units along with roads, parks and necessary utilities in an area of 231 hectares (Quigg 1981b). As is the case with all housing developments, the accompanying utilities (water, sanitation sewers, storm sewers, electical power and gas) will be placed underground. Consequently, the entire surface of the development zone will be altered from its natural state. There will be nearly complete disturbance of the subsurface to a depth of about 2 m during installation of the utilities and basements. Initial disturbance will come from sod stripping and earth stockpiling.

D1Op-2 lies to the southeast corner of the development, in an area designated as Development Stage 5 (Figure 31). The entire site will be destroyed by this housing development.

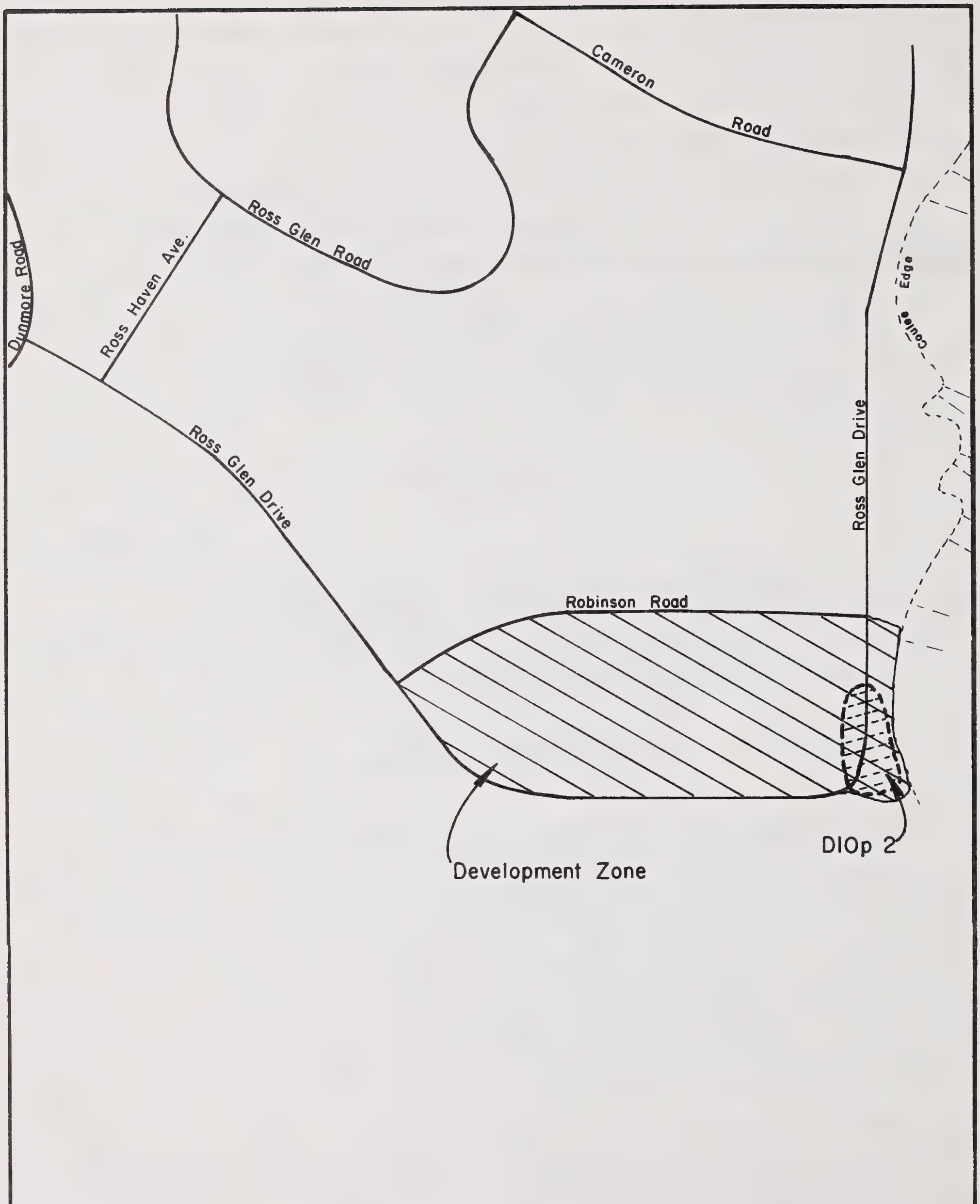


Figure 31: Location of the Ross Glen site (DlOp 2) within the planned subdivision development zone.

Drawn by J. Andreas.

6.0 ARCHAEOLOGICAL OBJECTIVES FOR MITIGATION

Having provided the archaeological background on the site from the 1978 assessment analysis plus the initial interpretations, the following objectives were formulated and were structured to investigate the previous interpretations and to acquire an adequate sample of cultural material from this significant site prior to its total destruction by the planned development:

1. Investigate the contemporaneity among the three clusters of stone circles (A, B, and C) and the individual rings within those clusters (Figure 30).
2. Gather specific data on the ancillary features in order to determine actual function and association with each other and with the stone circles.
3. Obtain direct evidence (faunal remains) for seasonality during the occupation.
4. Acquire specific distributional data on the various types of cultural material (debitage, FBR and ancillary features) which can be related to social patterns and/or preferences in and among the stone circle clusters.
5. Analyze and compare tool assemblages among the three stone circle clusters.
6. Analyze and compare the stone distributions within each stone circle in order to determine patterns and associations between stone circles and the three clusters.

The investigations were directed toward four analytical units. These units were perceived from the results and interpretations of the assessment program. The A and B ring clusters, believed to be of Besant association, became two analytical units, and the general cluster of ancillary features became a third unit. The two small stone circles (C), believed not to be associated with Besant, formed the fourth unit. Two stone circles which form Groups A (10 and 11) and B (13 and 14) were selected, along with the two unknown rings (16 and 17), providing a sample of six ring features (33 percent) for the purpose of investigating the various objectives. Given the importance and the number of ancillary features (6-17), a number were identified for investigation of the remaining objectives.

The accepted plans called for the excavation of 500 square metres, which represents only a 1.4 percent sample of this highly valued site. This area, coupled with the assessment program of 246 square metres, total 44 percent of the stone circles and 2 percent of the overall site.

7.0 FIELD AND ANALYTICAL PROCEDURES

The site had been investigated in the recent past and a number of initial steps, with respect to locating specific features and recording information, had already been completed. Subsequently, it was only necessary to establish the one metre units in excavation blocks over the stone circles and ancillary features, using the previously established grid system. Previously drawn stone circle maps were used to locate and record new field data. The site map, showing the location of individual features, was used extensively throughout the investigations.

The excavation procedure was oriented toward obtaining information which would answer the stated objectives. Block excavations were conducted at the six individual stone rings selected (10, 11, 13, 14, 16 and 17), using one metre squares for horizontal control (Figure 32) and two 10 cm arbitrary levels for vertical control. These six major block excavation areas then allowed five of the objectives (1, 3, 4, 5 and 6) to be investigated.

In order to investigate the second objective, a large block excavation (roughly 116 square metres) was initially concentrated in the area containing the ancillary feature cluster. However, this arrangement was slightly altered. There was a need to break up the one large block because of newly discovered disturbances. Therefore, a number of smaller one metre unit clusters were excavated at the various ancillary features being investigated (Figure 32).

The shovel was extensively used to excavate all units, with the trowel being preferred for work in and around the individual ancillary features and the stone rings. Exact provenience of the general material was not considered critical in addressing the objectives, although, where necessary, location of items inside or outside a feature was noted. The

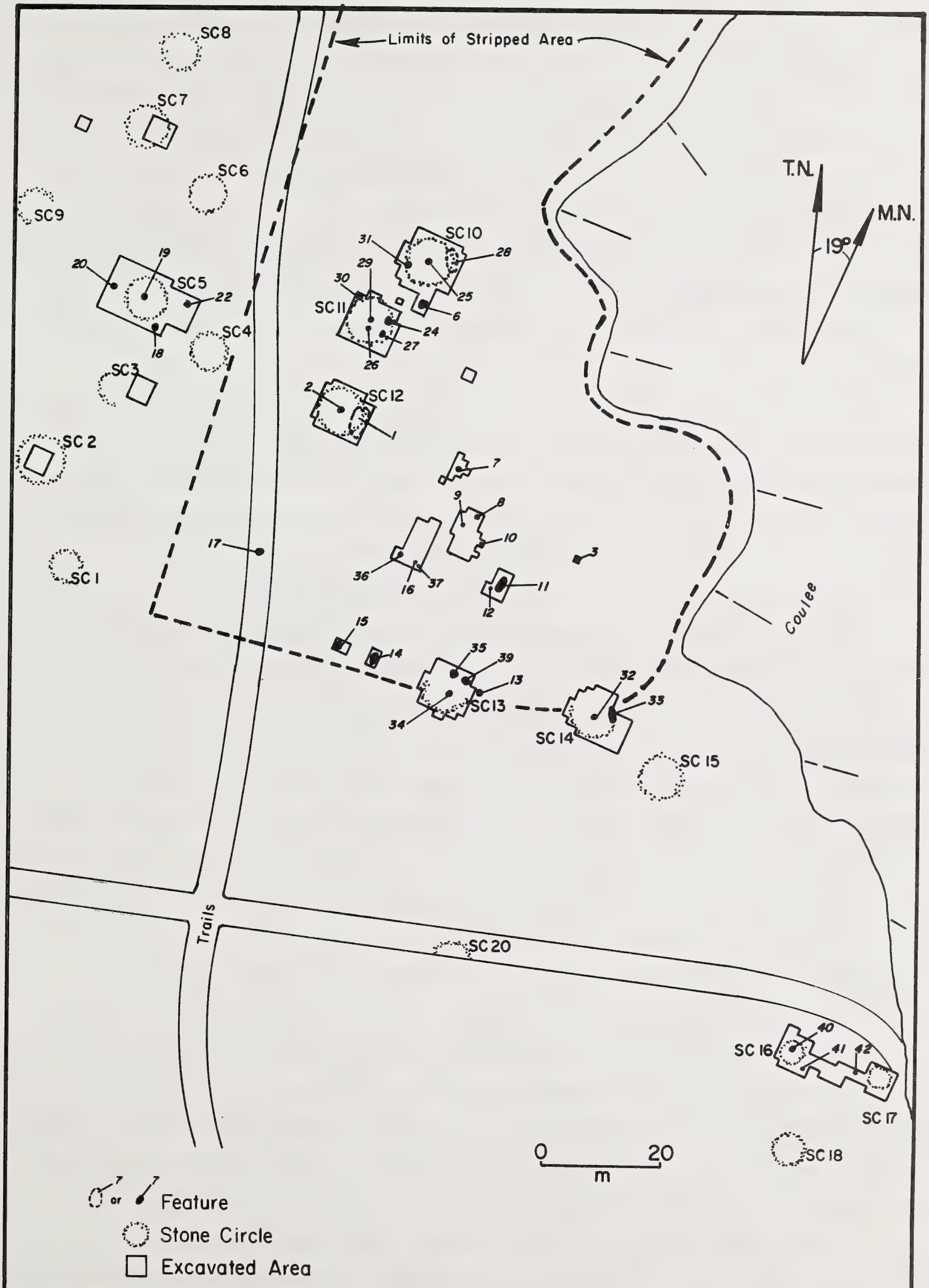


Figure 32: Location of stone circles and ancillary features within DlOp 2.

Drawn by J. Andreas.

general distributional patterns would become apparent through the one metre square proveniences. All soil (except for the 2 cm sod zone) was mechanically processed through a 6 mm mesh screen. Ancillary features (i.e., stains, hearths and refuse piles) were also fine-screened through 1 mm mesh screens. The latter samples were then bagged and labeled for future analysis.

Once individual concentrations of material (such as ancillary features) were exposed through excavation, these features were drawn on plan view maps. They were then cross-sectioned and the feature profile drawn.

Standard Archaeological Survey of Alberta level records were completed for every level excavated. Following the excavation, the natural stratigraphy was recorded from a number of representative wall profiles. Both colour slide and black-and-white photographs were taken of the various features, profiles and excavations.

Analysis of all cultural material began with washing and sorting the material into classes of information (i.e., lithic debitage, formed tools, bone and fire-broken rock). The fire-broken rock was classified into size categories, counted and weighed. Samples from large ancillary features were kept, as were the contents of small individual features, but most of the fire-broken rock was discarded. The bone, lithics, formed tools, etc. were then catalogued and individual formed tools were sorted for detailed analysis. A 15 percent sample (80 square metres) of the excavated units was carefully selected for detailed lithic analysis. The latter analysis included sorting of the debitage into major categories of flakes and shatter, then subdividing them into manufacturing stages (primary, secondary and tertiary). These classes were counted and weighed by unit; material types were also recorded. Culturally-worked specimens were classified into tool categories and specific attributes were recorded. The basic procedures and terminology used throughout this report follow the standard format utilized by Ethos Consultants Ltd. (Brumley 1981a).

All raw data from the various analyses were recorded on forms structured for use with an Apple II computer. Information was input for both storage and data manipulation. The figures and tables used throughout this report are a result of this information.

8.0 1981 EXCAVATION RESULTS

8.1 INTRODUCTION

Ethos Consultants initiated the investigations on June 20, 1981 and completed the work in early September, 1981. The crew size fluctuated between five and twelve individuals during this time. A total of 508 square metres were excavated - 392 square metres in and around six stone circles and 116 square metres in and around eleven ancillary features (6-16). Approximately 201.5 of the 508 square metres represent the inside area of the six stone circles.

Quantities of cultural material (lithics and fire-broken rock) were recovered, while formed tools (projectile points, endscrapers, and bifaces), charcoal and faunal remains were quite sparse. The Ross Glen site is believed to contain the highest known frequency of ancillary features of any stone circle site in the Northern Plains and ranks high in ancillary features in comparison to all other sites in Alberta.

The following section provides a discussion of each specific class of material investigated during the 1981 excavation program, including stone circles, stone tools, lithic debitage, fire-broken rock, bone and ancillary features. The final sections will deal with the site as a whole and present ideas and interpretations reflecting the Ross Glen site.

8.2 CIRCULAR STONE FEATURE EXCAVATIONS

8.2.1 Stone Circle 10

Stone Circle 10 was located in the stripped portion of the site and was detected by a few widely spaced and deeply buried stones (Figure 33). A total of 95 square metres were excavated inside (53 square metres) and outside (42 square metres) this ring (Figure 33). Material associated with this stone circle was quite plentiful (Table 17). This feature was mapped in 1978, with 56 stones weighed and their depths measured, but an additional 73 stones (56 percent) were discovered during the excavations in 1981 (Tables 18 and 19). Also, these stones were found primarily in 15 clusters (Figure 33) with a range of 3-10 stones

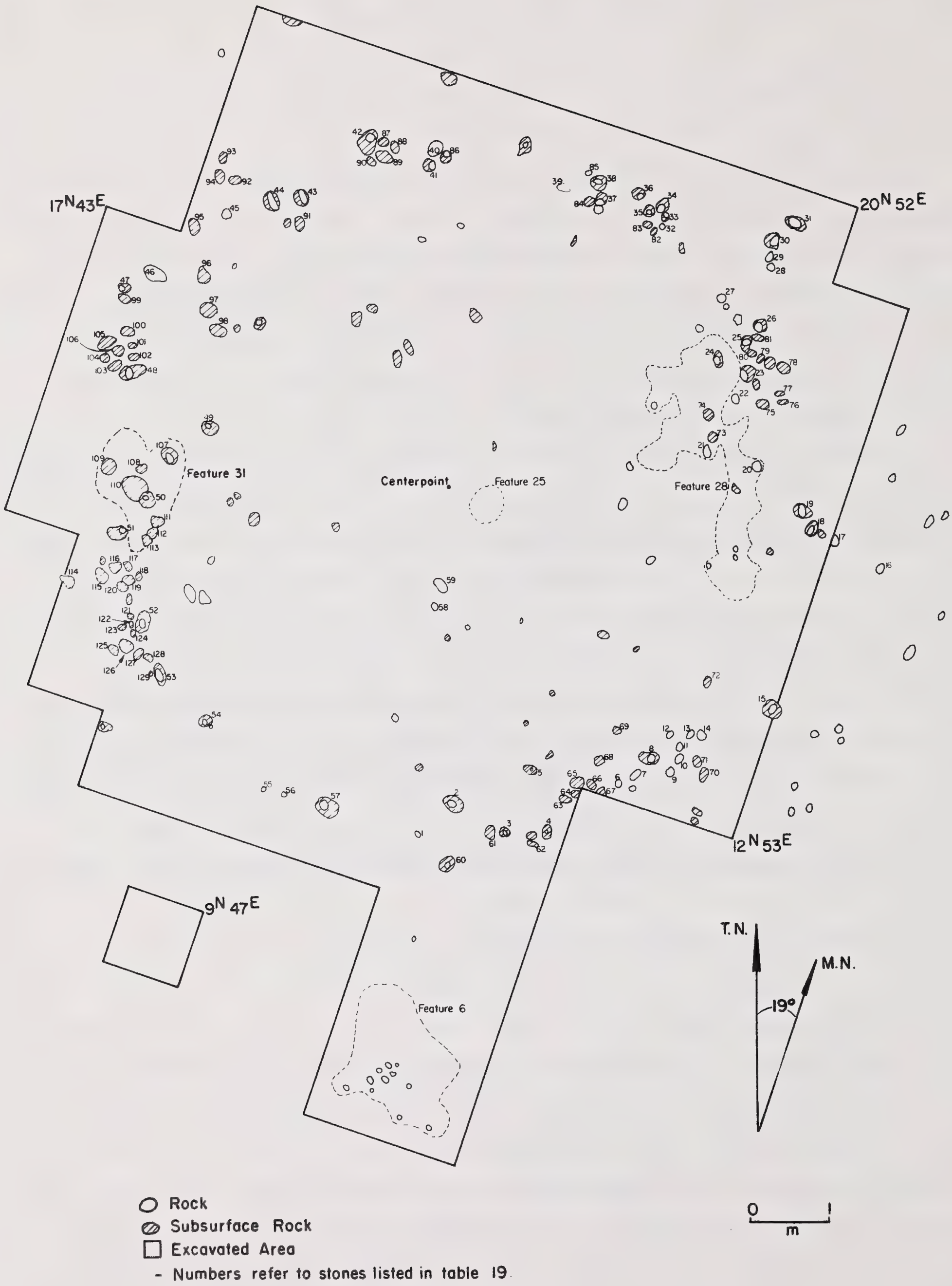


Figure 33: Stone circle 10 showing excavated area, DlOp 2.

Drawn by J. Andreas.

per cluster. Accordingly, the original average depth calculated for this ring (Table 10) was 1-3 cm shallower than the true depth.

The figures in Table 17 indicate that there is nearly three times the density of FBR inside (45.5/2417 g per square metre) as compared to outside (16.4/450 g per square metre) this feature. As well, the density for lithic debitage is skewed heavily toward the inside (49.4/square metre inside in comparison to 18.1/square metre outside). Per-square-metre figures for the overall stone circle (32.6 for FBR and 35.6 for lithics) are almost equal. A single projectile point was found just outside the stone circle and the feature at the northeast side of the stone circle (Feature 28) and was identifiable as Besant.

8.2.2 Stone Circle 11

Stone Circle 11 was also located in the stripped area and appeared to be very similar to Ring 10 (Figure 34). Seventy-two square metres were excavated in (49 square metres) and around (23 square metres) the stone circle (Figure 33). The feature was mapped in 1978 with observed stones (34) being weighed and their depths measured (Table 21); however, depths were not recorded for stones subsequently discovered during excavations. Consequently, one can assume the average ring depth would have increased one or two centimetres. There was a slight build-up of stones on the east side with a couple of clusters noted. The overall density of cultural material was quite similar to the two previous rings (Table 20).

Again, there was a high density of FBR (Table 20) inside (32.5/square metre) as compared to outside (6.2/square metre) the stone circle, while there was a 2:1 ratio of lithic debitage for inside (52.7/square metre) versus outside (28.3/square metre). The overall average of 69 pieces of FBR and lithics per square metre is quite dense. All projectile points were basal fragments and classified as Besant; consequently, this feature is assigned to that phase.

8.2.3 Stone Circle 13

Stone Circle 13 was completely excavated, with 50 square metres representing the inside and 16 square metres representing the outside area (Figure 35). This feature was mapped in 1978, with 19 stones being

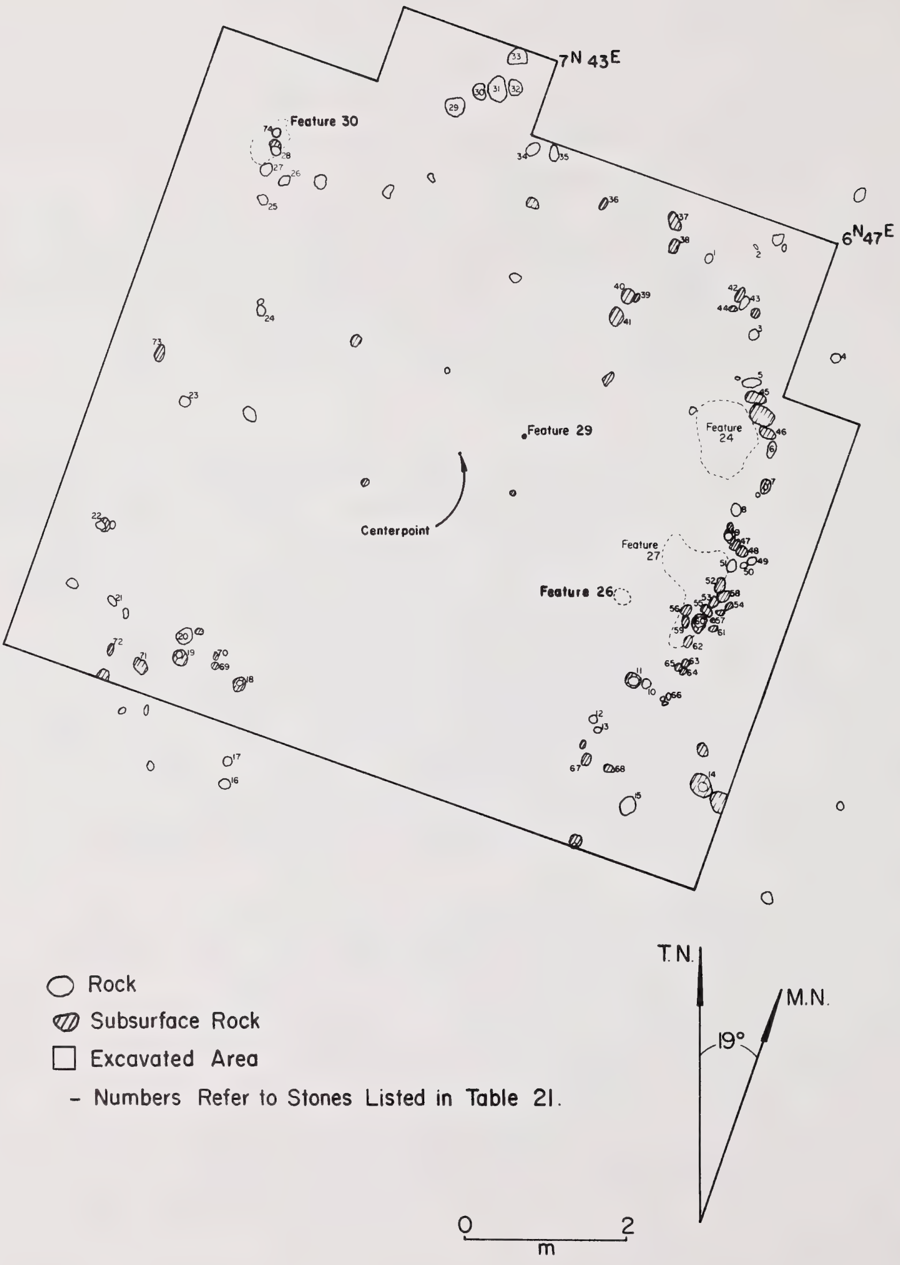


Figure 34: Stone circle II showing excavated area, DlOp 2.

Drawn by J. Andreas.

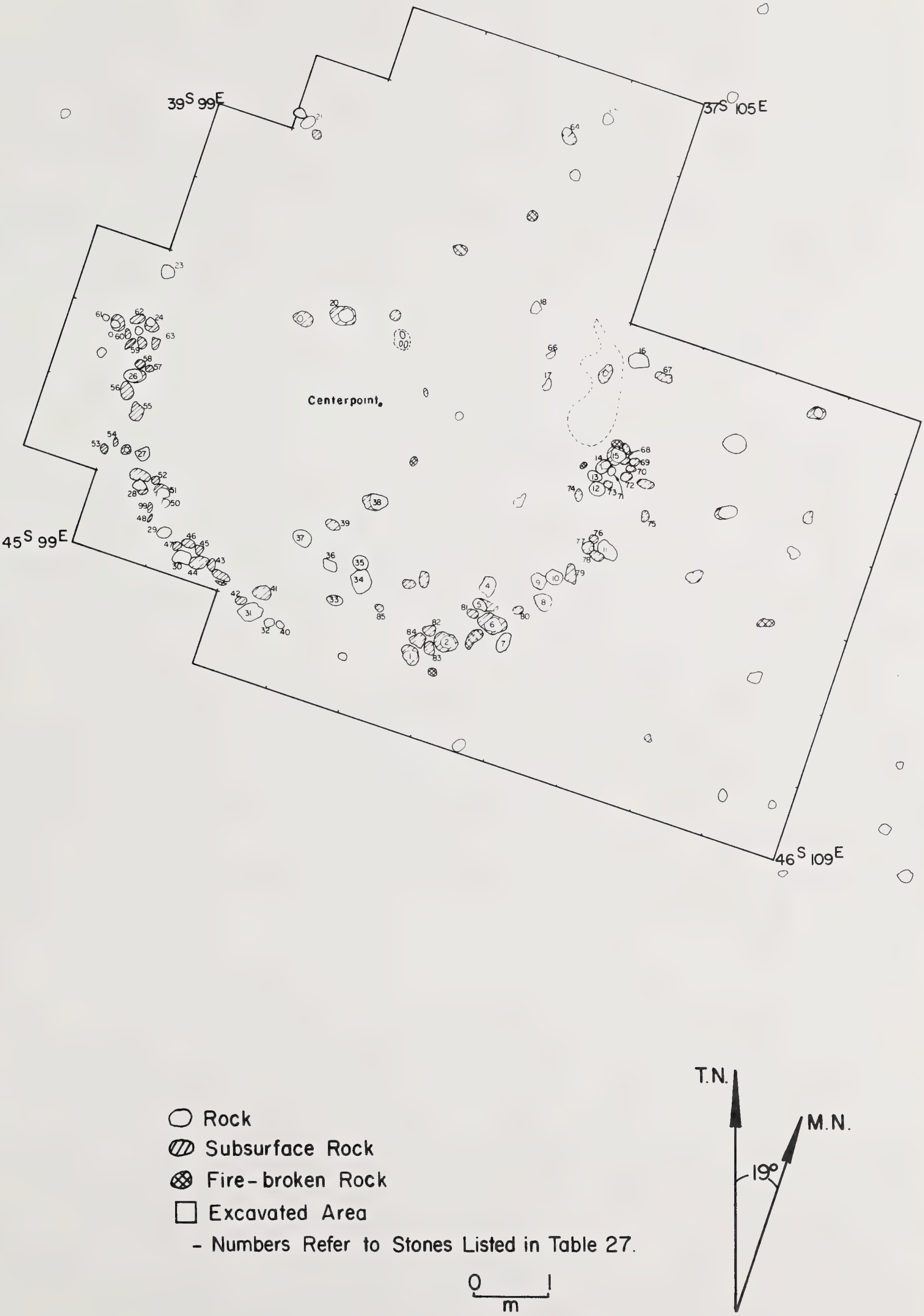


Figure 36: Stone circle 14 showing excavated area, D1Op 2.

Drawn by J. Andreas.

observed, weighed, and their depths measured; another 28 stones were discovered in 1981 (Tables 23 and 24). Although the depths of the latter were not recorded, it is believed the average depth of the stone circle would have been 1-3 cm deeper than shown in Table 10. Approximately one-third to one-half of the northern part of the ring was in the stripped area. However, the author believes that if stones were present prior to the stripping, they would have remained in the ground due to the combination of shallow stripping (3-4 cm) and burial depth of the other stones (12-15 cm). The frequency of FBR and lithics (only 48 pieces/square metre) differs considerably from the two previously excavated rings. Table 22 displays the actual figures.

Stone Circle 13 is the only ring which had less lithic material per square metre (20.1) than FBR (27.8), although the density of FBR inside (30.6) was still greater than outside (19.25) as was the case in the other rings (Table 22). The lithic debitage shows nearly the same density ratio, 2:1 (22.5/square metre inside versus 12.6/square metre outside), as do the three former rings.

The three projectile points recovered from this ring were not classified as Besant. A point tip was unclassifiable, one base closely resembled a Hanna point (Figure 60:14) and the third complete specimen was a well-made, large, side-notched point classed as Bitterroot (Figure 60:15). Consequently, Stone Circle 13 is believed to represent a separate Middle Prehistoric occupation which was much earlier than the Besant occupation (see Section 9.0).

8.2.4 Stone Circle 14

Stone Circle 14 was mapped in 1978, with 38 stones observed on the edge of the stripped area. Most of the stones were in the non-stripped area. It was difficult to see how the shallow stripping would have affected any of the stones because they were so deeply buried. The complete excavation of this ring (31 square metres), coupled with the excavation around and to the east side (45 square metres), revealed limited cultural material (Figure 36). Also, 47 new ring rocks were discovered, which would indicate that these stones were deeper than the first 38. Consequently, the initial average depth of 14.47 cm is too shallow. With the entire ring exposed, clusters of stones were observed

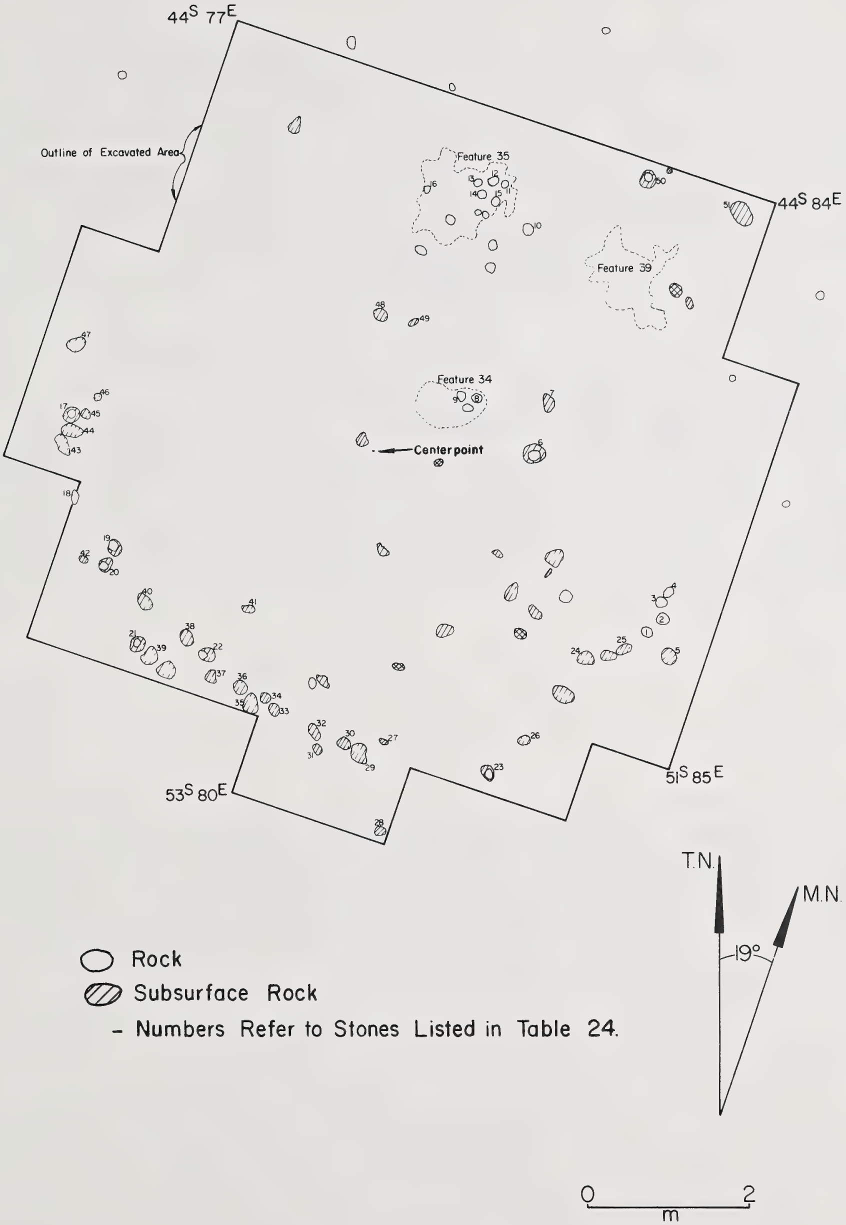


Figure 35: Stone circle 13 showing excavated area, DlOp 2.

Drawn by J. Andreas.

on the south side (Figure 37), similar to those in Ring 10. There were eleven clusters, with four to thirteen stones per cluster (Figure 36). Specific information on the ring stones is presented in Tables 26 and 27.

The material associated with this ring (Table 25) was considerably less (19 pieces/square metre) than from the others. This is the only time we note the density of FBR was greater outside (11.8/square metre) than inside (6.2/square metre). The lithics revealed the usual 2:1 ratio inside (13.3/square metre) versus outside (6.8/square metre) the stone circle.

Two of the three points were merely fragments and therefore unclassifiable. The third was complete and was identified as Besant. The ceramics were totally unexpected and constitute a significant discovery. Even though the pieces are small, and only a few general statements can be made concerning them, direct association between the Besant point and pottery is the first occurrence for Alberta.

8.2.5 Stone Circle 16

Stone Circle 16 was mapped in 1978, with eighteen stones being weighed and their depths measured (Tables 29 and 30). The original map was subsequently lost in a strong windstorm. This past year (1981), a new map was drawn and another 24 stones were recorded following the complete excavation (Figures 38 and 39) of the stone circle (10 square metres) and the area around it (35 square metres). Again, the original mean depth (7.67 cm) was too shallow by 1-3 cm. The overall density of material was again higher (45.2/square metre), with the general distribution and frequency shown in Table 28.

FBR was extensive inside the ring, due to Feature 40, and the density inside the ring (55/square metre) reflects this factor. Only light scatter was recorded outside (13.4/square metre). The lithics continued to show the 2:1 ratio inside (38.3/square metre) in comparison to the outside (18.1/square metre) the ring. Lithics and FBR exhibited equal densities.

No diagnostic materials were recorded, and dateable organics were sparse. Therefore, no age can be assigned to this stone circle feature. Given that the average depth of burial was significantly shallower than

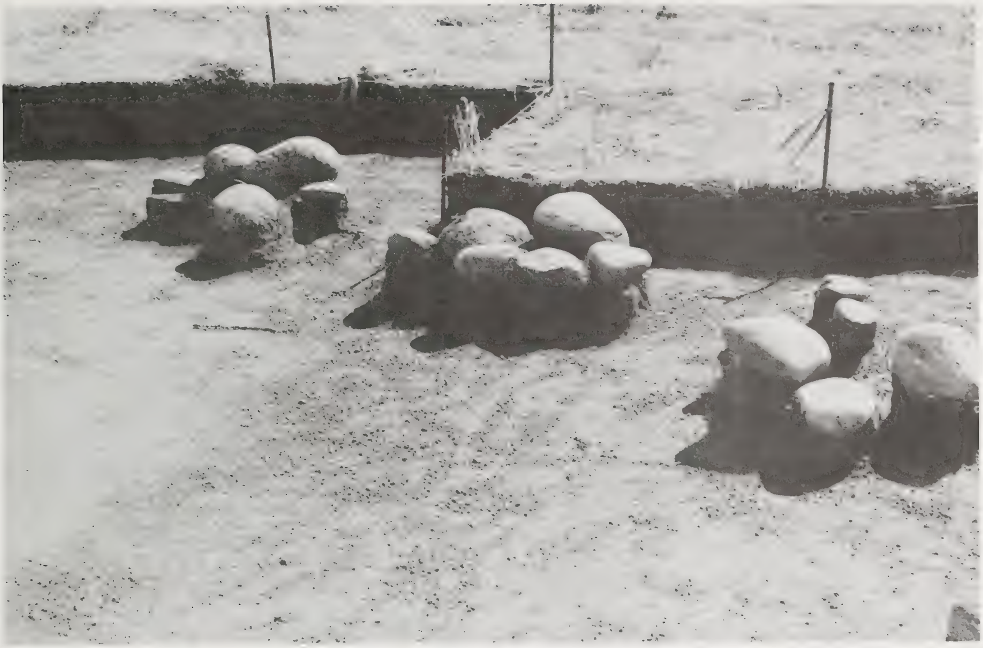


Figure 37: Clusters of ring rocks on east edge of Stone Circle 14.

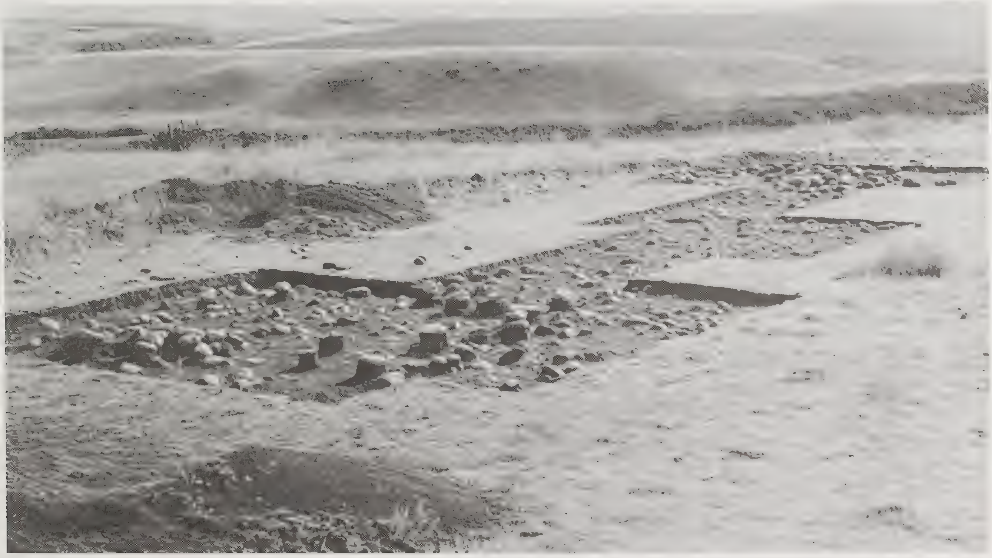


Figure 38: Stone Circles 16 and 17 completely excavated in 1981.

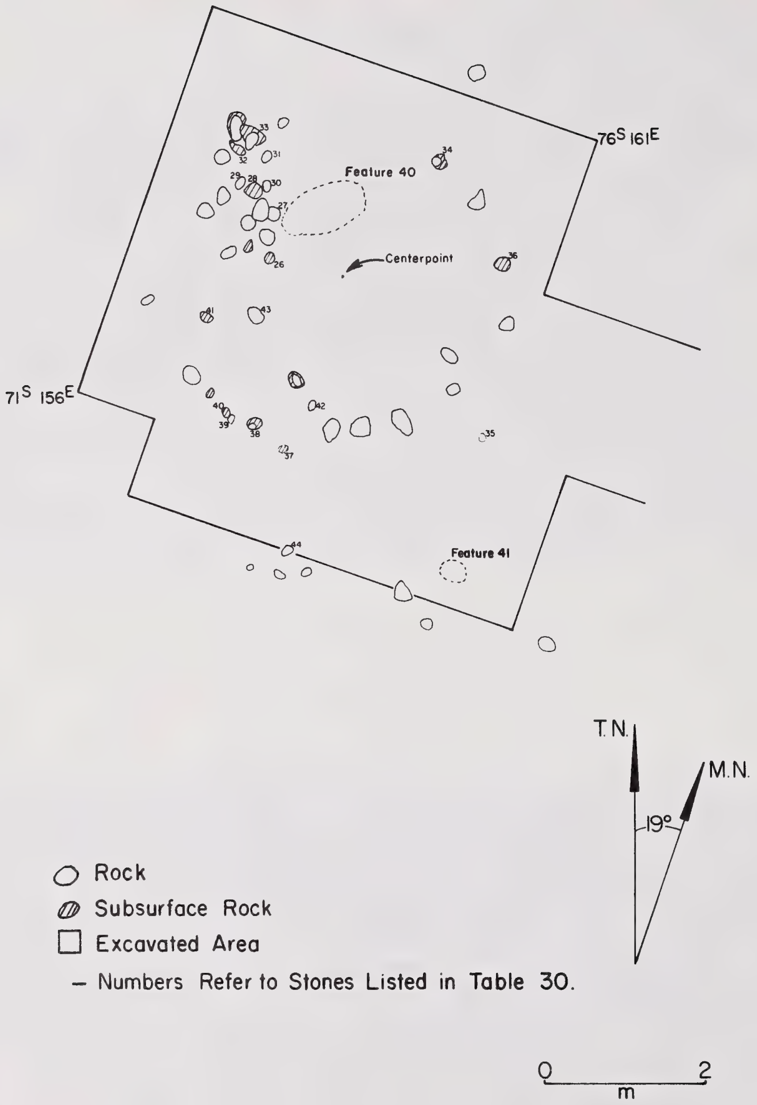


Figure 39: Stone circle 16 showing excavated area, DlOp 2. Drawn by J Andreas.

the proven Besant features, the author suggests the ring is from a later occupation.

8.2.6 Stone Circle 17

Stone Circle 17 was also mapped in 1978, at which time 32 stones were recorded and weighed and their depths measured (Tables 32 and 33). Following the complete excavation, only eight additional stones were believed to be part of this feature (Figures 38 and 40). Areas both inside (8.5 square metres) and outside (29.5 square metres) the stone circle were excavated, and relatively dense material remains (44.1 pieces/square metre) were noted. Table 31 depicts the type and frequency of these material remains.

The density of FBR was considerably greater outside the stone circle (19.8/square metre) compared to the inside (4.6/square metre). Lithics continue to show a 2:1 ratio for the inside (52/square metre) compared to the outside (20.6/square metre). Lithics (27.7/square metre) are also more numerous than the FBR (16.4/square metre).

Again, no time diagnostic items were recovered; thus, no age can be assigned to Stone Circle 17. Based on burial depth (8.66 cm) this stone circle is believed not to be associated with the Besant stone circles and can be dated to a later occupation. It likely represents the same occupation as Stone Circle 16.

8.2.7 Discussion

Excavation of the six stone circles revealed more specific data on the stone circles than were obtainable from the surface observations. Considerable quantities of cultural debris were discovered in addition to diagnostic remains (points and ceramics) from four of the six excavated stone circles.

The initial finding of Besant projectile points in three (10, 11 and 14) of the four assumed Besant stone circles supported the interpretation formulated after completing the 1978 assessment work. It is unfortunate, however, that no diagnostics were found in Stone Circles 16 and 17 which would enable the question of association between these and the other rings to be answered. Consequently, Stone Circles 16 and 17 are still believed to represent a separate occupation later than Besant.

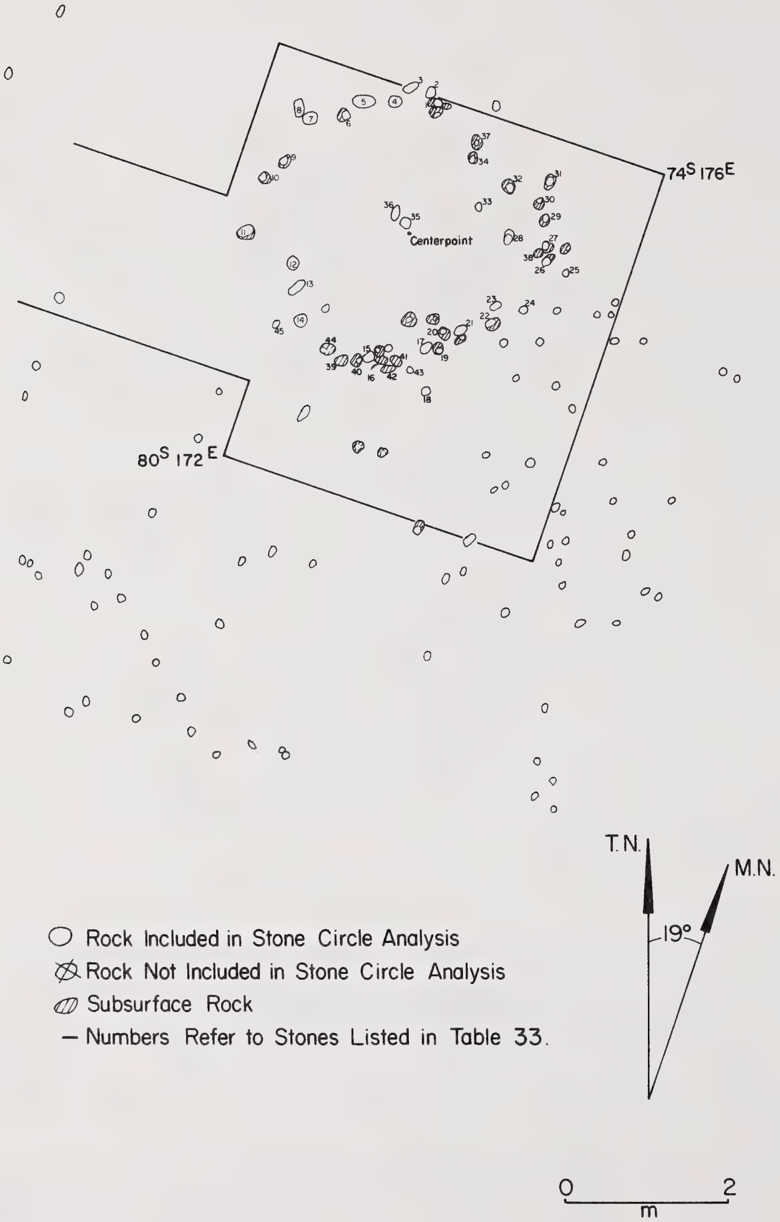

74S 176E
Centerpoint
80S 172E
T.N.
M.N.
19°
Rock Included in Stone Circle Analysis
Rock Not Included in Stone Circle Analysis
Subsurface Rock
— Numbers Refer to Stones Listed in Table 33.
0
2
m

Figure 40: Stone circle 17 showing excavated area, DlOp 2. Drawn by J. Andreas.

The discovery of Bitterroot and Hanna points in Stone Circle 13 was totally unexpected. The discovery raises some doubt as to the contemporaneity of the excavated stone circles; however, one must also consider the percentage of those points recovered that were Besant. At present, the author feels that Circle 13 is unique and not representative of the site as a whole.

8.3 ANCILLARY FEATURE EXCAVATIONS

Individual ancillary features are described below and categorized into previously established types for the Ross Glen site (Table 34). Excavated Features 4 to 16 were discovered in 1978 in the open area between a number of the rings, while the remainder of features (24-42) were discovered during excavations of the stone circles. Following their individual descriptions is a general discussion of ancillary features.

8.3.1 Feature 4, FBR Pile

Feature 4 was a scattered, irregularly shaped, fire-broken rock concentration (105 x 125 cm) with some lithics (n=24) in association. No pit was observed in the profile, and no bone or carbon was recovered. It was located approximately 15 m due east of Stone Circle 11. The small, 0-5 cm FBR category dominated (n=189/1925 g), followed by the 6-10 cm size at 35/4297 g, and two pieces (956 g) of the 10-15 cm size. Feature 4 is interpreted as the by-product of cooking, possibly representing more than one cooking event. Other flakes and FBR were recorded around the concentration.

8.3.2 Feature 6, FBR Pile

Feature 6 was a well-defined fire-broken rock concentration (100 x 60 cm) located just three metres south of Stone Circle 10 and three and one-half metres northeast of Stone Circle 11. Most of the material was small FBR (n=425/2019 g), with some 5-10 cm in size (n=24/17,354 g). There were some complete (unfractured) stones (n=8/9949 g) and some lithics mixed in as well. No staining of the soil or profile was observed. Feature 6 is interpreted as a single event, consisting of FBR which was discarded after its use for boiling.

8.3.3 Feature 7, Boiling Pit

Feature 7 was a small, well-defined, basin-shaped pit (60 x 58 cm) full of FBR (n=582) which contained a couple of bone fragments at the very bottom. It was located 24 m southeast of Ring 12. The pit was excavated downward into the basal gravels while the upper portion was in sand (Figure 41). The FBR consisted primarily of 0-5 cm size stones (n=4495/1,608 g), followed by the 6-10 cm size (n=59/6424 g), the 11-15 cm size (n=24/18,149 g), and the 15-20 cm size (n=7/17,800 g). The majority of these pieces appeared to represent five or six stones which had fragmented. Three of the largest pieces were cracked but were still intact in the pit when uncovered. Feature 7 is interpreted as representing a single event, probably the boiling of liquid within a skin container.

8.3.4 Feature 8, Hearth

This feature was observed and recorded in 1978. It consisted of a black, roughly circular stain 20 cm in diameter. Nothing was observed in the stain at that time. It was located in the open stripped area between the rings, adjacent to Feature 9. This area was excavated in 1981 without rediscovering the stain. The weathering process had rendered it invisible. It is interpreted as representing a fire hearth associated with Features 9 and 10.

8.3.5 Feature 9, Hearth

This feature was comprised of a stained circular area (48 cm in diameter), containing loose concentrations of highly fragmented, burned and calcined bones (41.4 g) in an irregular but well-defined, basin-shaped pit (7 cm deep). Some ash was observed, along with a small area of reddened earth in the interior. Four flakes were also found on the upper surface. Feature 9 is located near Features 8 and 10. This hearth represented a single event and is interpreted as having created considerable smoke and heat from the grease bone fragments. This feature could also represent the remains of soup or bone grease preparation.

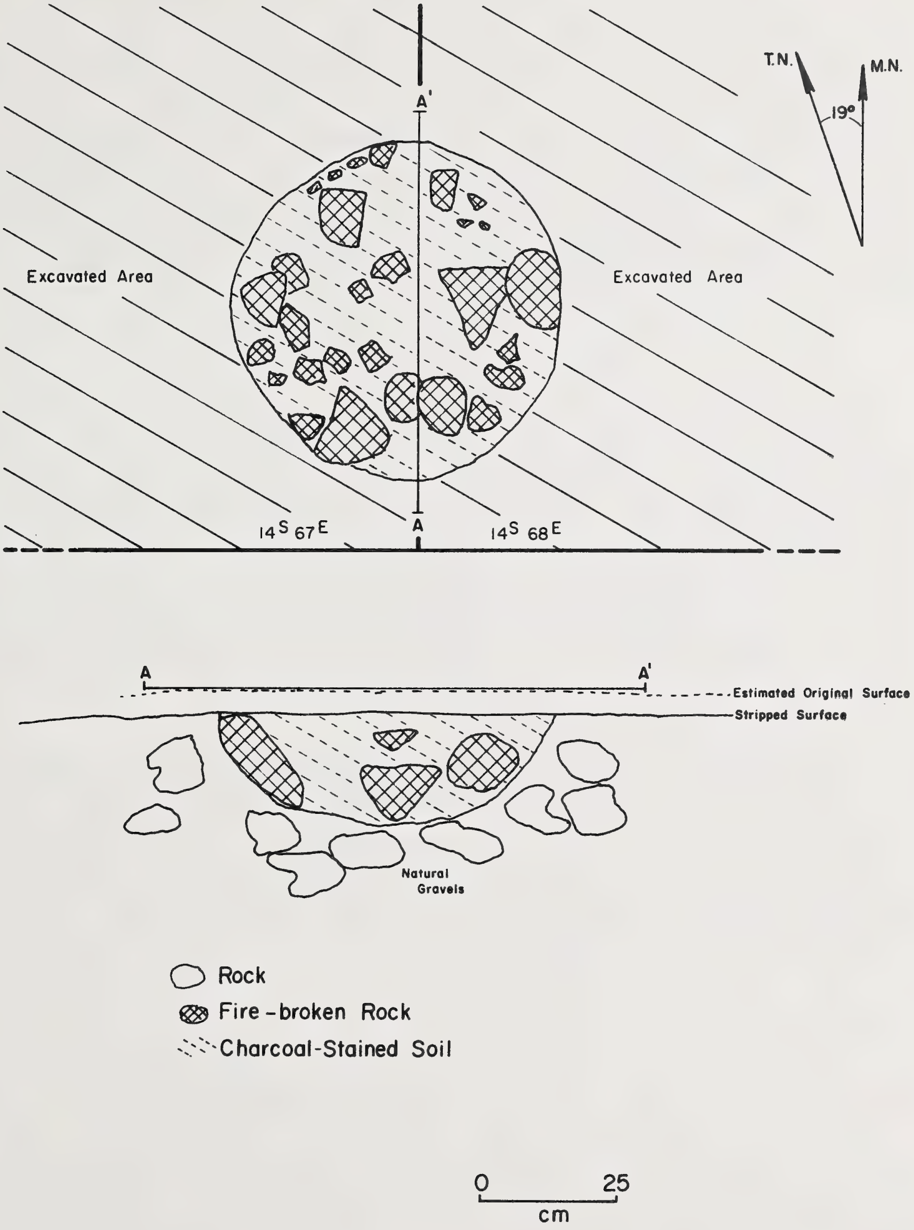


Figure 41: Planview of feature 7, $14^S 67^E$ and $14^S 68^E$, DlOp 2.

Drawn by J. Andreas.

8.3.6 Feature 10, Hearth

Feature 10 was represented by a roughly circular, black and orange stain (32 x 28 cm), with at least four post molds (Figures 42 and 43) clustered on the south side, 20 cm from the hearth. The hearth was shallow (6 cm), saucer- to basin-shaped in profile, with nothing found inside the stained area. The feature was located in the open area away from the rings and in association with Features 8 and 9. Four small cylindrical-shaped stains were discovered in association.

8.3.7 Feature 11

Feature 11 was an irregularly shaped concentration (173 x 110 cm) of lithic debitage (n=190), containing some small pieces of FBR (n=85) scattered throughout. There was no pit or stain observed and no bone or charcoal pieces were discovered in association. This feature was located 15 m north of Ring 13 and associated with Feature 12. It is believed that the lithics represent discarded debitage from stone tool production.

8.3.8 Feature 12

This feature consisted of a dark, roughly circular stain (38 x 43 cm) with quantities of burned and calcined bone fragments (594 g) throughout the stain (Figure 44). Faunal remains were loosely mixed with stained sand, contained in a 12 cm deep, basin-shaped pit. No post molds were found adjacent to this feature. It was associated with Feature 11, 14 m north of Ring 13. The bone fragments were collected for radiocarbon dating, and a sample of 594 g was submitted to Radiocarbon Ltd. This sample produced a date of 4260 ± 140 years B.P.; 3010 B.C. ± 160 (RL 1585; MASCA corrected). This date will be discussed in a later section of this report. Feature 12 appears identical to Feature 9 and, again, could be interpreted as the remains of a smoky fire or of soup or bone grease preparation. The former is preferred, given that most elements were burned to some extent.

8.3.9 Feature 13, FBR Pile

Feature 13 consisted of a small concentration (110 x 50 cm) of FBR with a few pieces of lithics, located just 2 m east of Ring 13. This feature was not excavated.

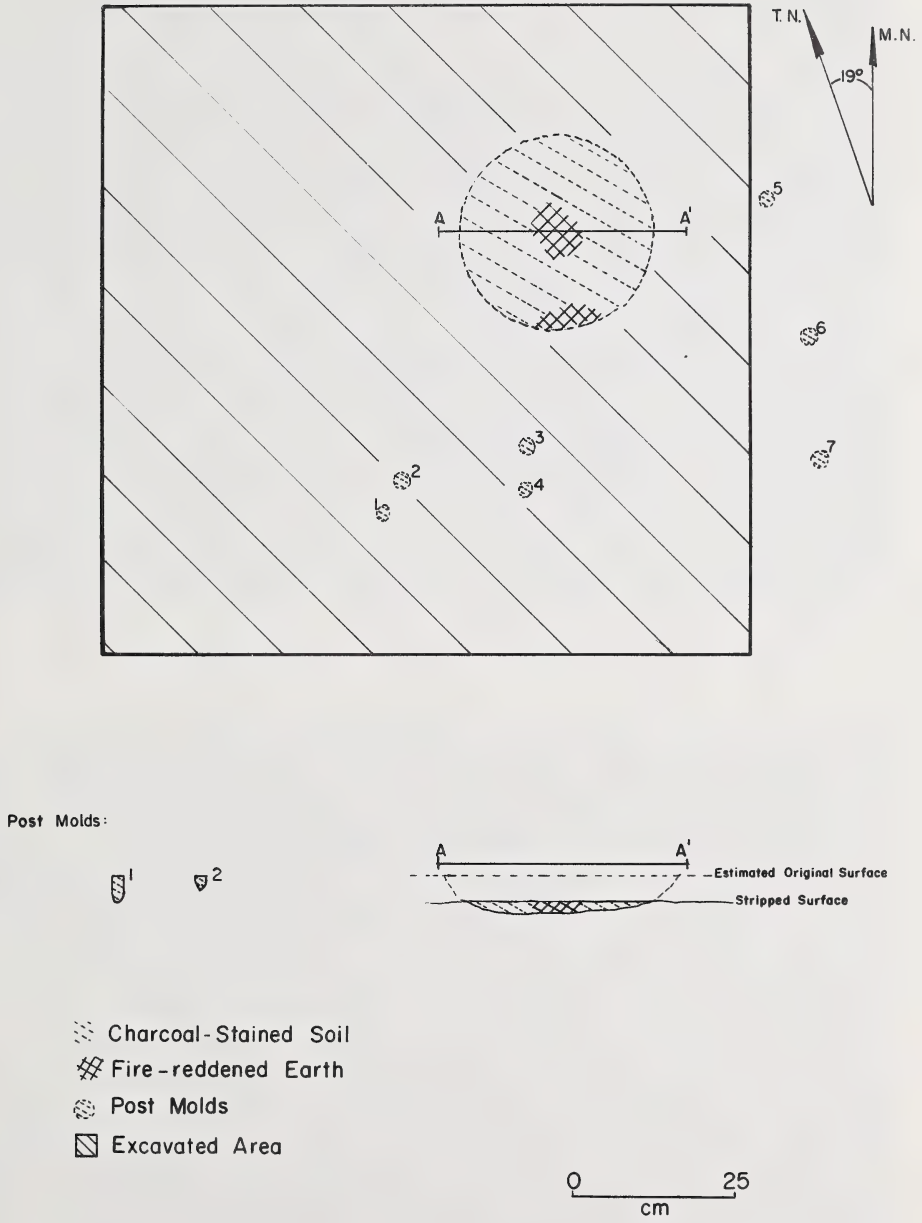


Figure 42: Planview of Feature 10, 24^S 75^E, D10p 2.

Drawn by J. Andreas.

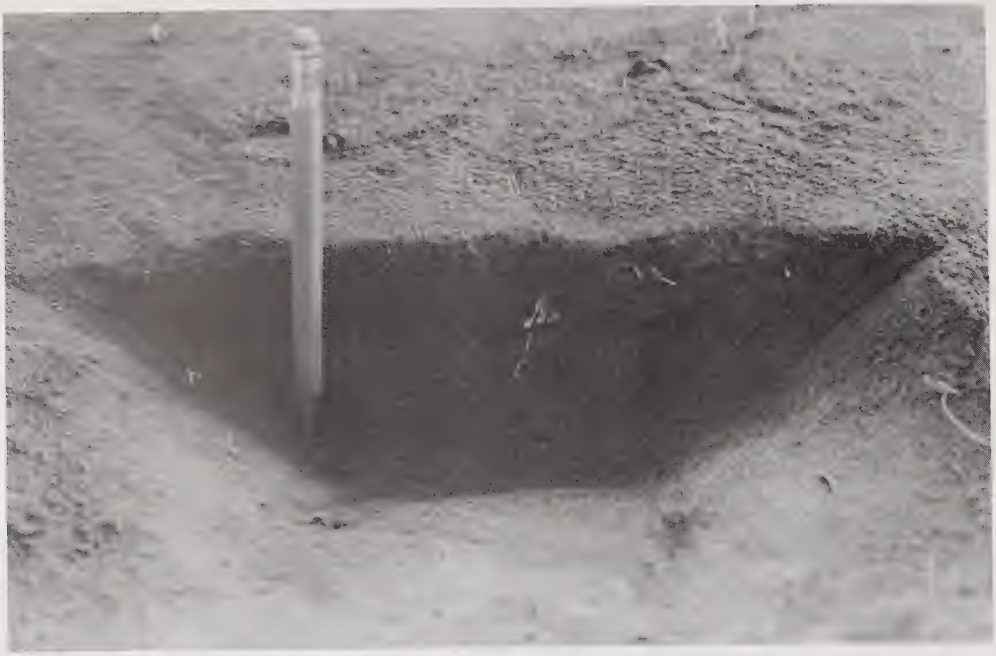


Figure 43: Post mold adjacent to hearth (#10) away from rings.

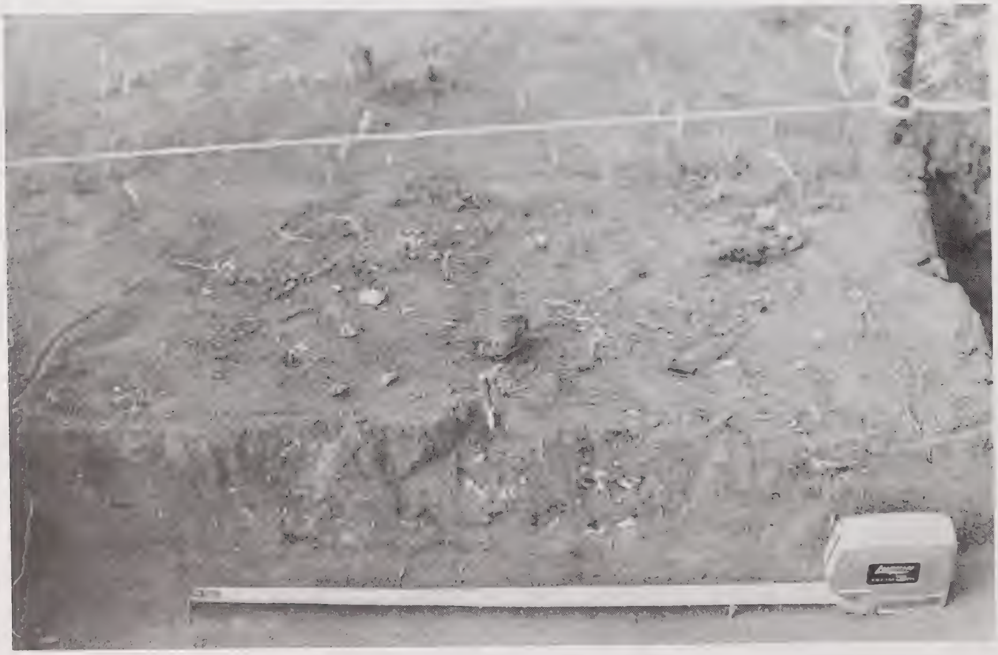


Figure 44: Hearth filled with burned and calcined bone fragments (Feature 12).

8.3.10 Feature 14, Refuse Pile

This was an irregularly-shaped concentration (250 x 200 cm) of FBR (n=619) and lithics (n=38), containing no evidence of any type of staining. No bones or charcoal were discovered in the concentration. Feature 14 was located 8 m west of Ring 13. The feature was detected in the stripped region of the site, which had 2-4 cm of the sod removed from the top of the feature. The lithics consisted primarily of quartzite debitage, some argillite, and one piece of Avon Chert. FBR was represented mainly by small (less than 5 cm) pieces. This feature is interpreted as possibly representing a number of events, during which the different materials were utilized and then discarded, followed by a presumed cleaning activity.

8.3.11 Feature 15, Refuse Pile

Feature 15 consisted of a light concentration (173 x 182 cm) of FBR (n=129) with some scattered lithics (n=38) in an irregularly-shaped outline. One hundred eleven pieces of FBR were less than 5 cm in diameter. No bone or staining was detected in the feature. The concentration had a thin irregular profile, with 5-7 cm having been stripped from the top portion. Again, quartzite debitage dominated the lithics. Feature 15 was situated 14 m west of Ring 13. A biface and point fragment were recovered 3 and 5 m, respectively, to the north of this feature. It appears identical to Feature 14 except in shape and is thus presumed to have served the same function as Feature 14 - a discard area following a number of events.

8.3.12 Feature 16, FBR Pile

This feature consisted of a small, thin concentration (55 x 68 cm) of FBR (n=48) with no bone or charcoal and only a couple of pieces of lithics observed. Most of the FBR (36 pieces) was less than 5 cm in diameter. This pile of FBR was located between Stone Circles 12 and 13 in the open, sandy area. It is believed to represent the remains of boiling activities from a single event. It is directly associated with Feature 36.

8.3.13 Feature 24, Refuse Pile

Feature 24 was a concentration (100 x 80 cm) of FBR (n=278) and lithics (n=155) in a roughly oval pattern on the east side, inside Ring 11. Bone fragments (n=31) were also found under pieces of FBR. The feature was irregular in profile and completely buried, although the top surface (2-4 cm) had been previously stripped. This concentration is believed to represent a number of events which produced the debris and was then dumped following cleaning activities.

8.3.14 Feature 25, Hearth and Post Mold

This feature was a saucer-shaped basin with faint, black staining surrounded by a thin orange stain (Figure 45) which was identified near the centre of Ring 10. Nothing was observed inside the stain (32 x 42 cm), although tiny bone fragments, flakes, FBR and a limited amount of carbon were found immediately adjacent to this stain. A post mold, cylindrical in profile, was located 10 cm to the northwest of the stain. The hearth reflects a possible warming feature in which grass or dung was used as fuel. The post mold may represent a tie-down stake for stabilizing the overall structure.

8.3.15 Feature 26, Hearth

Feature 26 was a roughly oval-shaped grey stain (16.5 x 21 cm) toward the eastern side of Stone Circle 14. It was inside the ring, just west of Feature 27. A single petrified wood flake was recovered inside the stain, but no bone or charcoal was observed. The stain was saucer- to basin-shaped in profile, with the top portion having been stripped. The grey stain was edged on the bottom and sides by a 1.5 cm band of dark black stain. This feature is interpreted as representing a small warming hearth inside the structure.

8.3.16 Feature 27, Refuse Pile

This was a concentration of FBR (n=153), and debitage (n=105) with no bone or charcoal. It was of irregular shape (125 x 85 cm) and located on the inside eastern edge of Stone Circle 11. Feature 27 was basically one rock in thickness, with an irregular to flat profile. It is believed

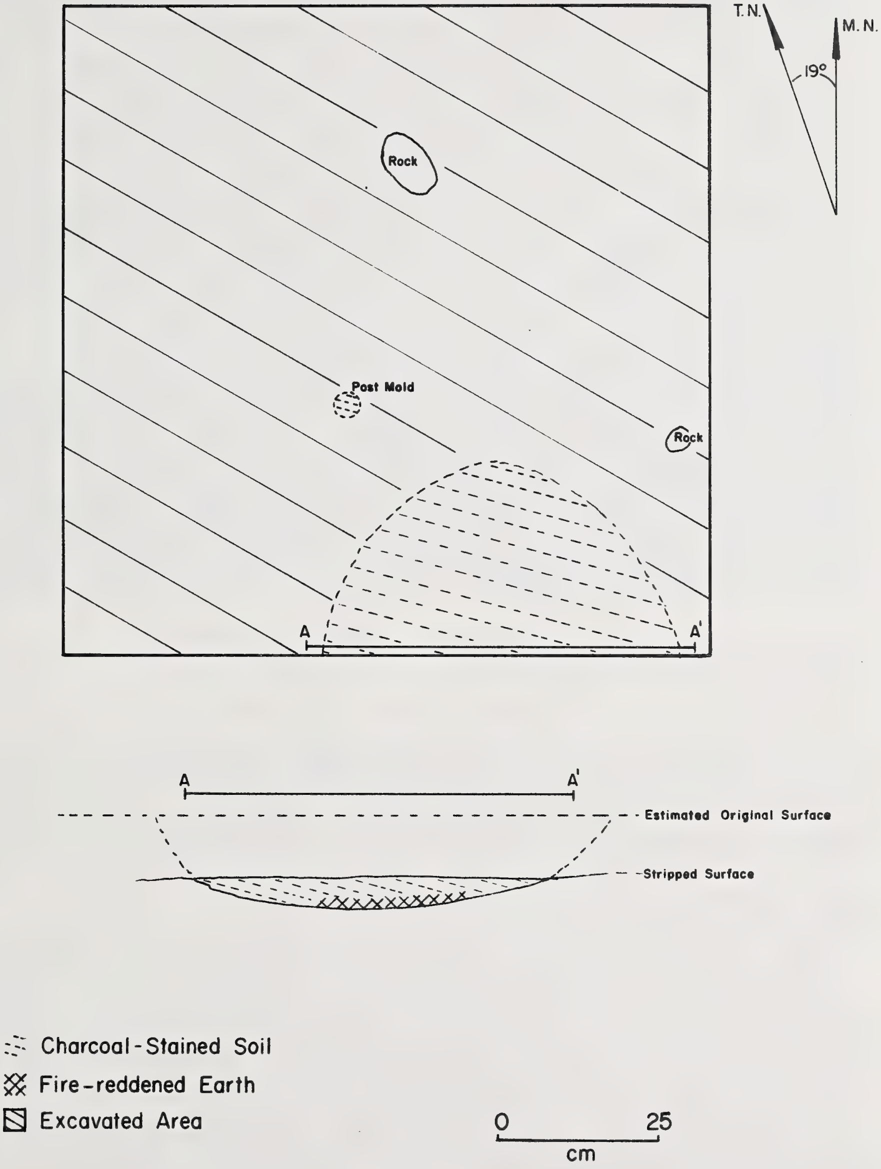


Figure 45: Planview of Feature 25, $15^N 49^E$, D10p 2.

Drawn by J. Andreas.

that the material came from a number of events and represents the remains of cleaning activities.

8.3.17 Feature 28, Refuse Pile

This feature was originally labeled Number 5, but subsequently was changed to 28. It consisted of an irregularly-shaped cluster (285 x 215 cm) of FBR (n=958) and lithics (n=147), with some bone fragments (113.6 g), located on the eastern edge of Stone Circle 10 (Figure 46). The middle portion appeared to be two to three stones in thickness with marginal areas being only one stone thick. The ring rocks were slightly dispersed at this locality, but generally they were located on the east edge of this cluster. The profile was irregular to flat. Again, this feature probably represents a number of different events with the pile resulting from general clean-up following these tasks. The thicker area represents the main portion of the pile, while some portions were obviously slightly scattered.

8.3.18 Feature 29, Post Mold

Feature 29 was a well-defined, dark cylindrical stain, 5 cm deep and 2 cm wide (Figure 47), located near the centre of Ring 11. A variety of material was recovered from the unit in association with it. It may represent a tie-down stake for the overall super-structure.

8.3.19 Feature 30, Hearth

This was a small, black stain (40 x 40 cm) on the outside edge of the stone circle rocks comprising Ring 11. A buried stone on the stain's eastern edge was completely blackened. A cross-section revealed an irregular, basin-shaped pit with limited charcoal fragments in the loose black fill. One FBR and a few flakes were also mixed with the fill. This feature probably reflects a single event.

8.3.20 Feature 31, Refuse Pile

Feature 31 consisted of a cluster (100 x 74 cm) of FBR (n=166) and lithic debitage (n=51) on the western margin of Ring 10. The ring rocks were scattered in this area, but Feature 31 appears to be situated just inside the circle. There was no staining or bone in association with the

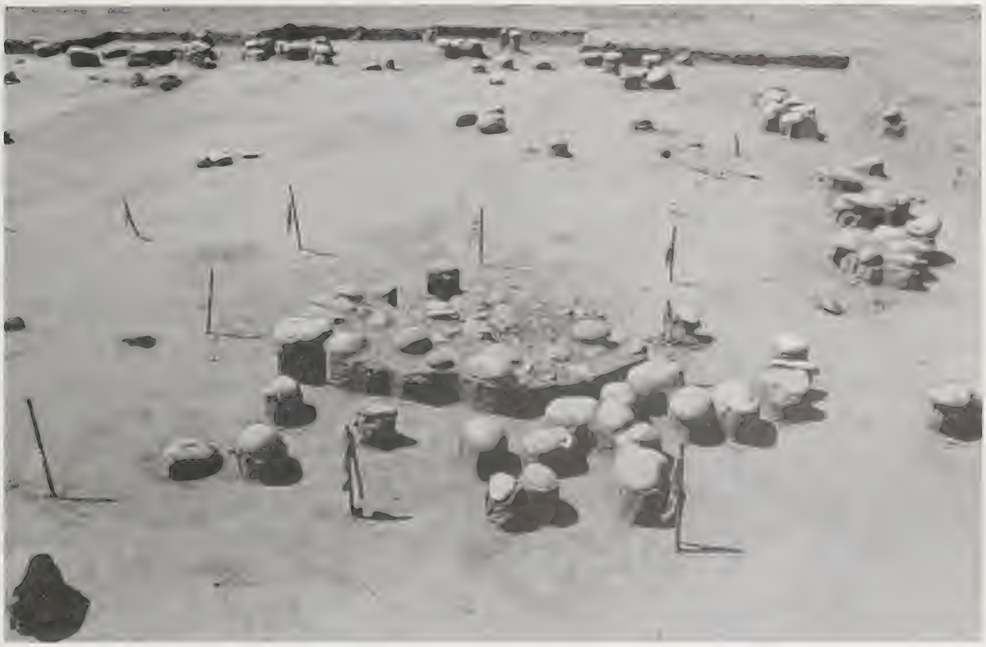


Figure 46: Refuse pile (Feature 28) inside eastern edge of Stone Circle 10.

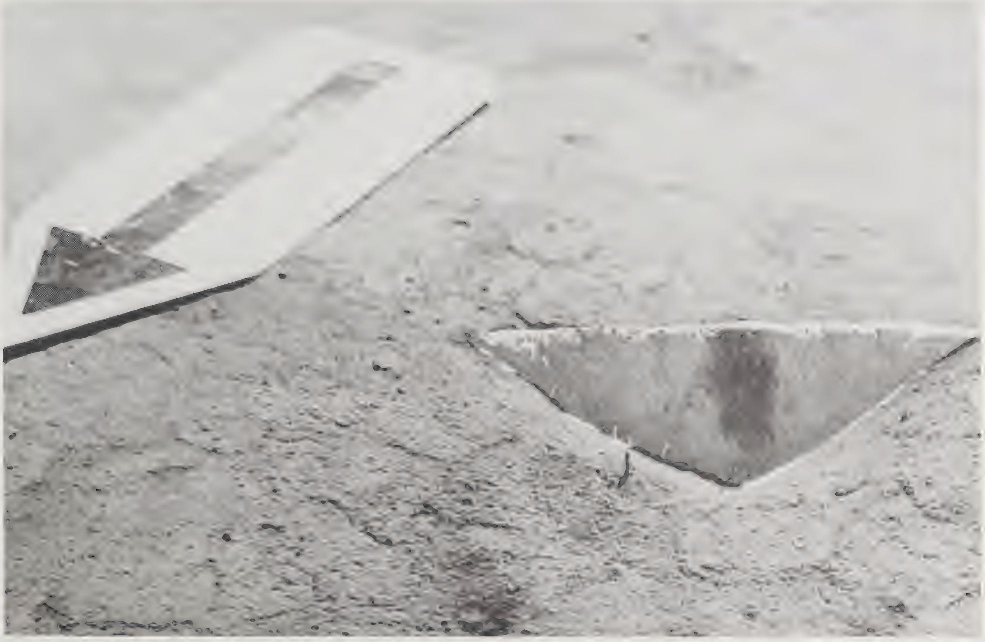


Figure 47: Post mold (Feature 29) inside Stone Circle 11.

feature. The pile was one stone in thickness, with an irregular to flat profile. This feature is interpreted as representing a number of events and was probably the result of general cleaning activities inside the stone circle.

8.3.21 Feature 32, Hearth and Post Mold

This feature (42 x 45 cm) was composed of three large pieces of FBR inside a blackened, saucer-shaped pit (Figure 48). The northwest side of the black fill was bordered by a 2 cm red stain. This feature was located near the centre of Stone Circle 14, while the post mold was 43 cm southeast of the hearth. The latter is 2.5 cm in diameter and 2 cm deep, revealing a blunted point at the bottom. The hearth is believed to represent a central warming hearth and the post mold probably reflects the location of a tie-down stake for the super-structure.

8.3.22 Feature 33, FBR Pile

Feature 33 (112 x 72 cm) was a dense concentration of FBR (n=544) on the inside, eastern edge of Stone Circle 14. No staining or bone was observed, and the pile contained only a limited amount of lithic debitage (n=4). It appeared to have an irregular to flat profile. This pile could represent one or more events resulting in the deposition of discarded material in this location.

8.3.23 Feature 34, Hearth

This feature was indicated by a black oval stain (47 x 58 cm), with a number of rocks and FBR (n=41) in and immediately northeast of the stain (Figures 49 and 50). The stain was saucer-shaped in profile with two patches of red staining underneath the black stain and a deep black stain at the very base. The bulk of FBR weight came from the 21 pieces greater than 5 cm in diameter. Feature 34 was near the centre of Stone Circle 13 and was associated with Features 35 and 39. It appears that this hearth was used to heat stones for the stone boiling process.

8.3.24 Feature 35, FBR Pile

Feature 35 consisted of an irregularly-shaped cluster (120 x 130 cm) of FBR (Figure 51) and rock (n=306) with a few pieces of lithic debitage

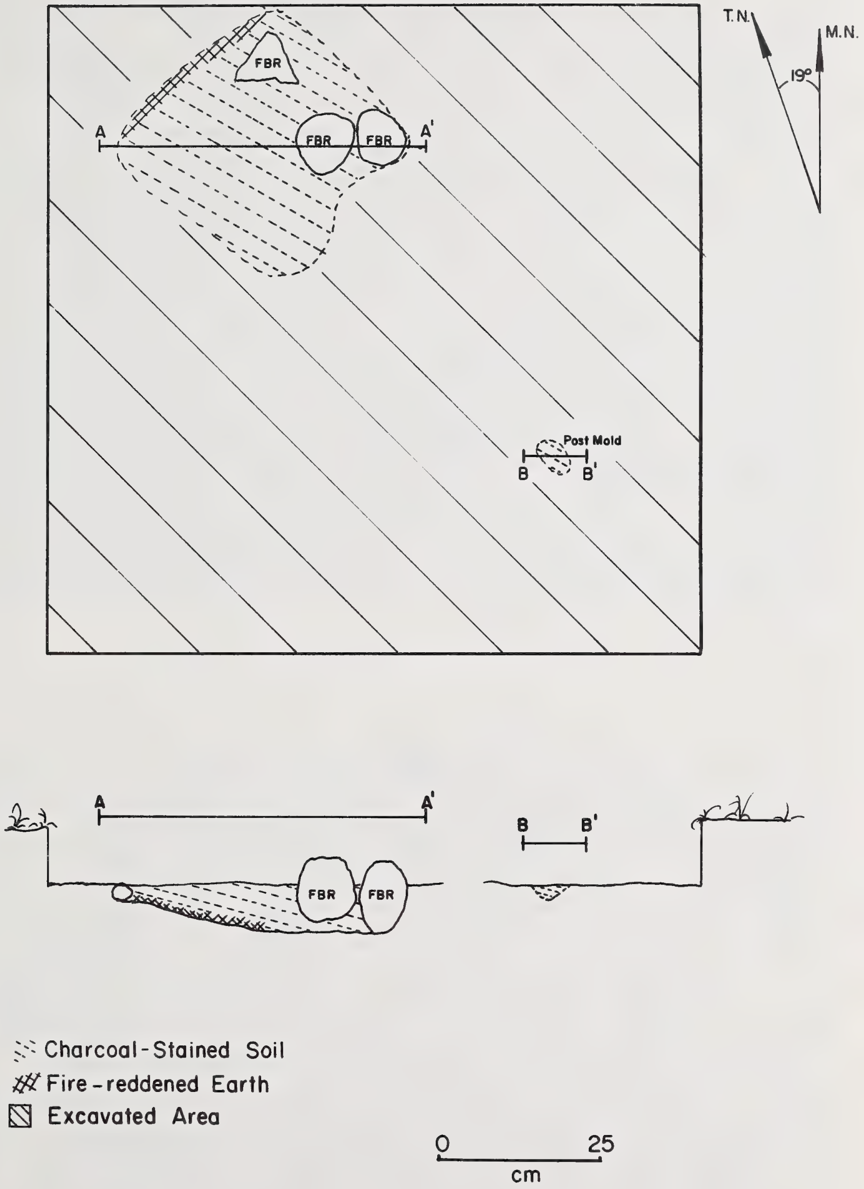


Figure 48: Planview of Feature 32, 42^{S} 103^{E}, D10p 2.

Drawn by J. Andreas.

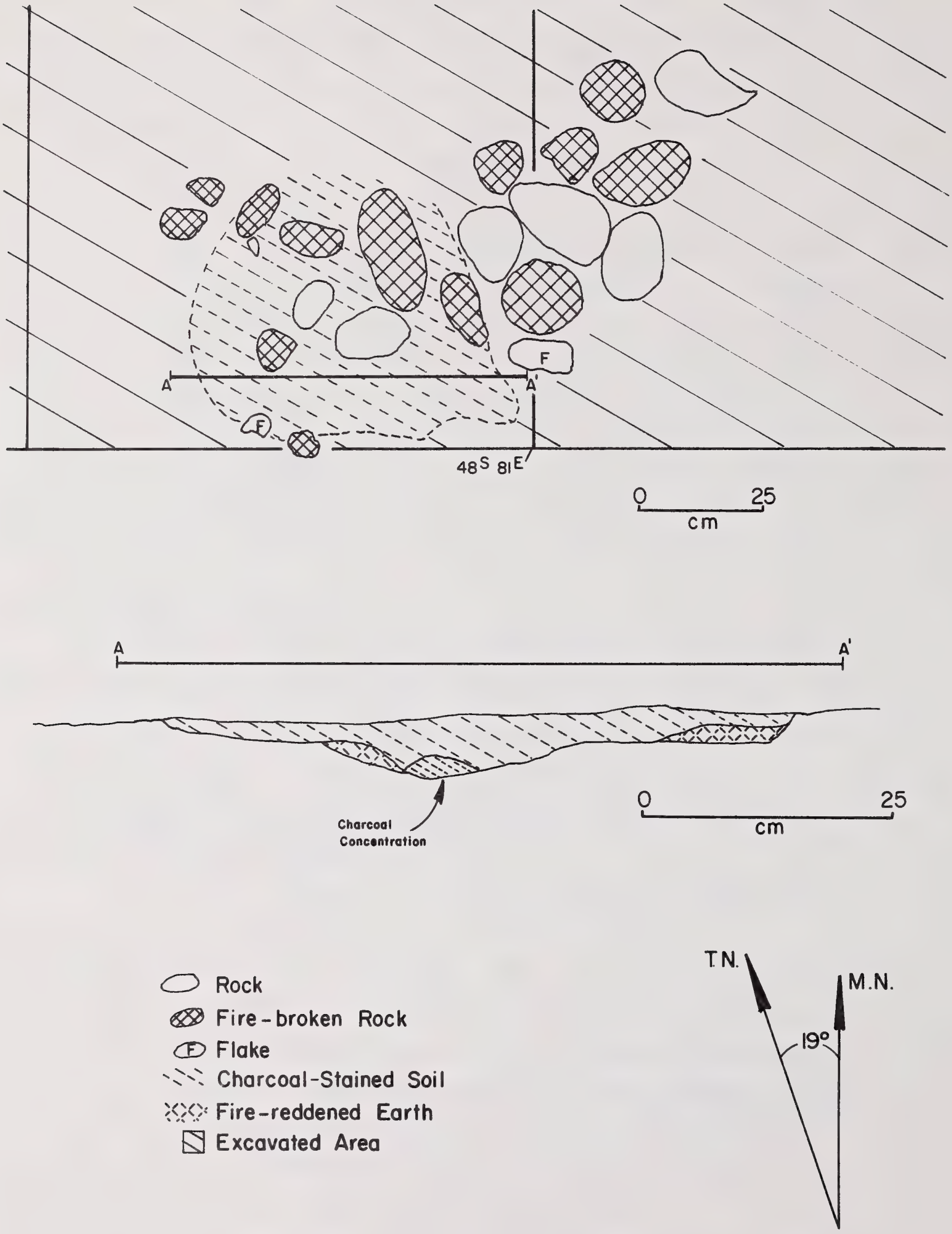


Figure 49: Planview of feature 34, 48^S 81^E, DIOp 2.

Drawn by J. Andreas.

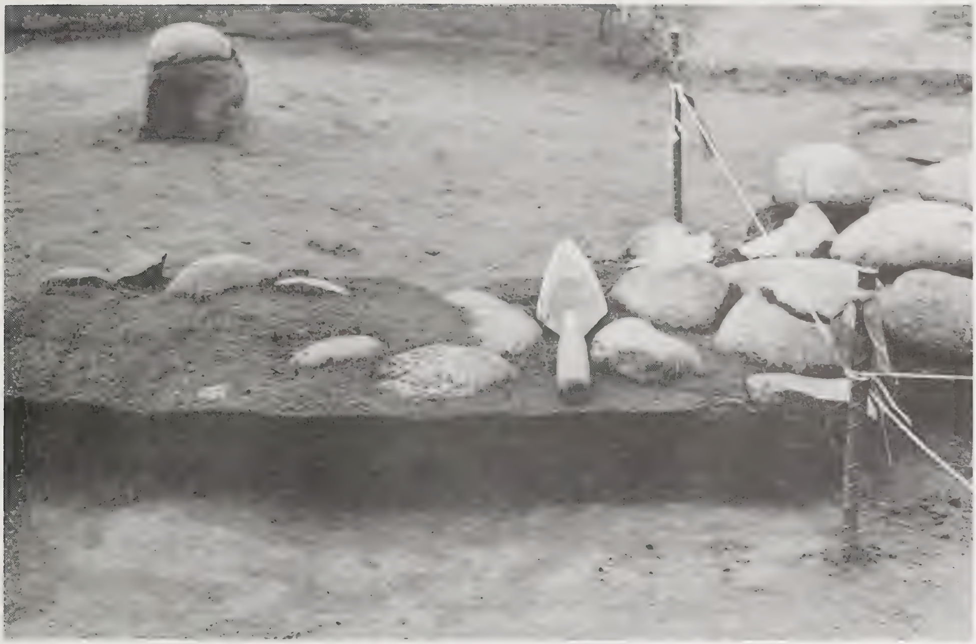


Figure 50: Central hearth (#34) inside Stone Circle 13.

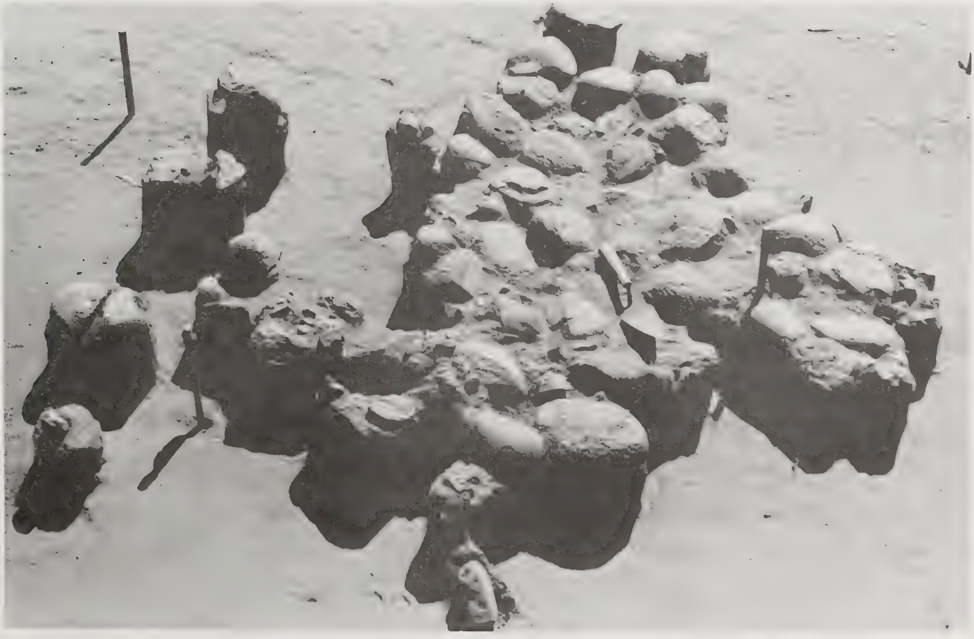


Figure 51: Fire-broken rock pile (#35) on north edge of Stone Circle 13.

(n=17) on the north side (inside?) of Stone Circle 13. The FBR was generally quite small (n=229 pieces under 5 cm in diameter). There was no staining, but a few bone fragments were recovered. The profile was flat and just one stone in thickness. This feature is interpreted as being a dump location for FBR used in the boiling of liquid. More than one event may have been necessary to accumulate the quantity of FBR recovered.

8.3.25 Feature 36, Knapping Area

This feature was a short line of natural stones around which were clustered, in irregular pattern (140 x 130 cm), roughly 41 pieces of debitage, one MRST and five small FBR fragments. There was no bone, charcoal or staining present and the feature showed nothing in profile. This feature was situated between Stone Circles 12 and 13, 3 m west of Features 16 and 37. It appears to represent general knapping activities in which quartzite was the primary material being worked.

8.3.26 Feature 37, Hearth

Feature 37 was an irregular, shallow, basin-shaped pit which was mottled by black, grey and red staining. It was circular in plan view (23 x 24 cm), with the grey fill dominating. One piece of FBR was located on the surface at the stain margin. This hearth was 20 cm southeast of an FBR pile (Feature 16) and is interpreted as being a hearth used for heating the stones used in the boiling process.

8.3.27 Feature 39, FBR Pile

Feature 39 was a scattering (115 x 135 cm) of FBR (n=104), very few pieces of debitage (n=5) and one unifacial tool. Boundaries are ill-defined, with material scattered around. No staining or charcoal was apparent. The FBR pieces were generally small (n=66 less than 5 cm in diameter). Feature 38 is associated with Features 34 and 35 and is probably inside Stone Circle 13. The latter is questionable, however, given the unknown location of the ring boundary in the vicinity of Features 39 and 35.

8.3.28 Feature 40, Hearth, Post Mold and Pit

This feature was a cluster of two or three features located inside Stone Circle 16. One was a black, oval hearth (27 x 35 cm) in 78s159e, containing a piece of FBR and a post mold. It was a shallow, saucer-shaped stain with no bone or charcoal. The post mold, at the southwest corner of the stain, was very shallow due to the natural gravels below. Two or three light black smudges were observed 40 cm to the north of the hearth. Twenty centimeters to the southwest was an FBR concentration in a circular pit (54 x 53 cm). The pit extended into the natural gravels and was basin-shaped in profile, with a light black-stained fill mixed with the FBR pieces. The hearth may have served as a heating location for the stones used in the boiling pit immediately adjacent to it. The post mold could have been a tie-down stake for the general structure, or it could have been used with the hearth itself.

8.3.29 Feature 41, Hearth

This feature was a roughly circular, black stain 1.5 m southeast of Stone Circle 16. It had patches of both light and dark staining, but no charcoal or bone, in a 6 cm basin-shaped pit. It is interpreted as a hearth in which buffalo dung or grass was used as fuel.

8.3.30 Feature 42, Boiling Pit

Feature 42 was a circular, black soil stain with some small pieces of FBR in and immediately adjacent to the stain. The stain was saucer- to basin-shaped in profile and appears to have been excavated nearly 25 cm into the basal gravels (Figure 52). A band of dark black stain 2-3 cm wide marks the outer boundary at the base of this feature. Based primarily on its depth and the few FBR pieces, the author believes Feature 42 resulted from its use as a pit to boil liquid.

8.3.31 Discussion of Ancillary Features

Initial categorization of these features into groups resulted in an interpretation of their general use, based on the dominant material recovered at each. However, the exact function of any given hearth is unclear as is the functional significance of burned or calcined bone fragments found in a hearth. Most individuals relate the tiny bone

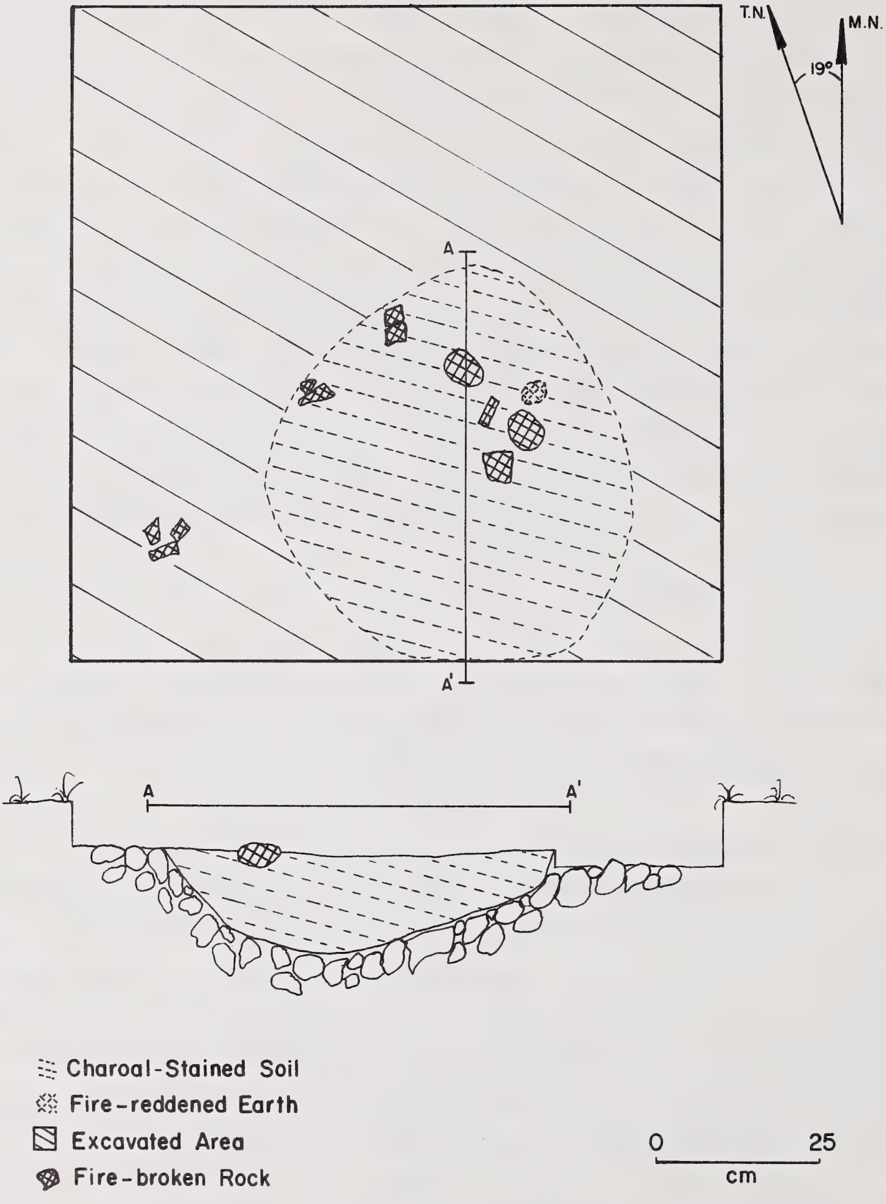


Figure 52: Planview of Feature 42, 78^{S} 168^{E}, DlOp 2.

fragments to bone grease preparation (e.g., Leechman 1951, Vehik 1977, and many others), but they fail to mention anything about the tiny burned and/or calcined fragments directly in a hearth. It is difficult to see how the bones would burn unless they were exposed directly to flames or heat. If they were exposed, then the author would assume substantial heat and smoke was a by-product of the grease in the bones. It is also difficult to understand how a basin-shaped hearth functioned since the shape would have limited the air supply. This would seem to cause more smoke and less fire. The excavation might have been advantageous if skin containers were used in the depressions to hold liquid or if smoke was the intended result of the hearth. If skin linings were present, some of the post molds may represent stakes that were used to hold down the skins. Most ethnographic and historical literature provides interpretations of different hearths, but few detailed descriptions accompany these. See Section 4.3.5.1 for an explanation of the calcined bone fragments in hearths. These (Features 3 and 12) were interpreted as smudge pits, possibly used or smoking hides (Lowie 1922:217). The post molds recorded near the central hearth probably represented tie-down stakes for the structure above it. Campbell (1915:688-691) tells of a rope stretching from the crotch of the main tipi poles near the top to a stake at or near the centre of the lodge during periods of heavy winds. It is apparent that experiments with hearths would be quite beneficial.

The distribution of these ancillary features implies the occupants had selected a sandy area away from the living structures at which many of the outside activities were undertaken. Also, there appears to be a direct association between specific types of ancillary features away from the structures. For example, there are a number of small circular excavated hearths in the open area that were immediately adjacent to other features, such as FBR piles (#16 and 37) and knapping areas (#12 and 11). Refuse piles inside the structures (#10, 11 and 14) were all on the east margin of the stone circle. This occurrence was a consistent pattern throughout the site. Post molds and central hearths were also quite frequent, showing another similarity among these stone circles. An exception to the interior refuse pile distribution was observed in Stone Circle 13 where two FBR piles, not refuse piles, were uncovered at the north side of the feature. This is also the stone circle where the Bitterroot and Hanna projectile points were recovered.

8.4 CULTURAL MATERIAL

8.4.1 Introduction

In this section discussions will centre on the non-feature specific materials, such as lithic debitage, fire-broken rock, formed tools and ceramics, which were recovered during the 1981 excavations (508 square metres). The extremely high frequency of lithic debitage (flakes and shatter) precluded an individual treatment of this category. Consequently, a 16 percent sample of the 508 square metres was selected for detailed analysis. This sample (80 square metres) was stratified to account for materials inside and outside the stone circle features and the ancillary features. It was also done in order to make direct comparisons between the three groups of stone circles (A, B and C) under investigation. The overall distribution of lithic debitage and fire-broken rock within the 508 square metres is depicted and discussed following each appropriate section.

8.4.2 Lithic Debitage

The 1981 excavations yielded 12,877 pieces of lithic debitage (Table 35). A 16 percent area sample (80 square metres) was deemed suitable for providing general information concerning the debitage and overall interpretations. The 80 square metres were carefully selected to provide a comparable sample between the stone circles and for the area between these rings. A schematic drawing (Figure 53) shows the appropriate area of each stone circle which was selected for the 16 percent sample. The 11 square metres per six stone circles were combined with a block of 10 square metres from regions around the ancillary features, but the latter 10 square metres were not associated with any particular ancillary feature. Also, roughly 4 square metres encompassing Ancillary Feature 14 (refuse pile) were selected. Table 36 provides a list of all the units comprising the sample. The 80 square metres selected yielded a total of 2,609 pieces of debitage (weighing 32,386.5 g), 63 marginally retouched stone tools, 3 projectile points, 24 cores, 4 bifaces, 1 uniface and

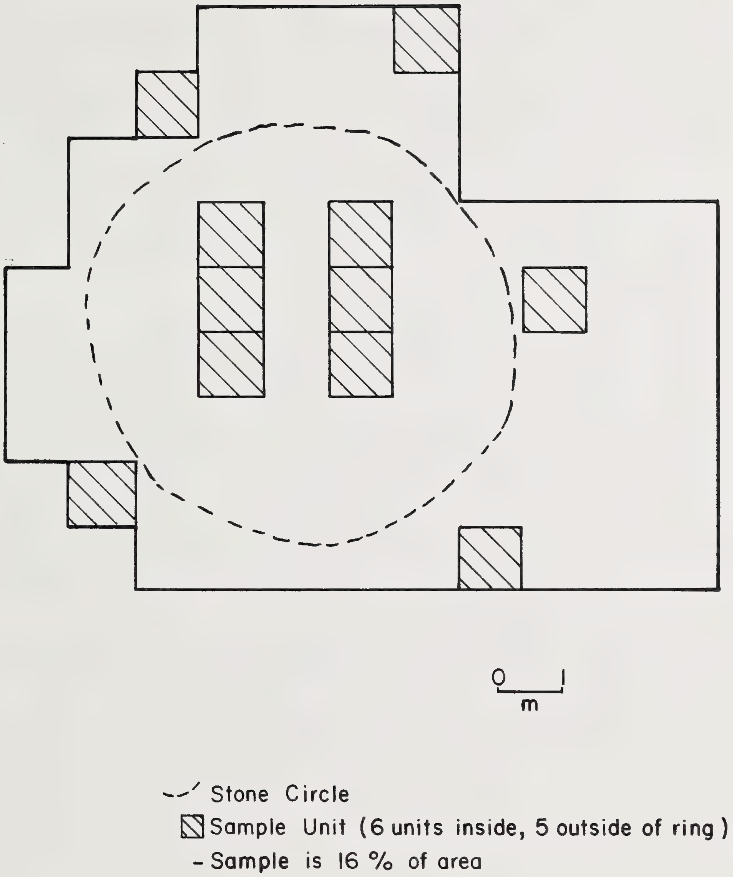


Figure 53: Schematic drawing showing general location of 11 m^2 selected from each ring. Drawn by J. Andreas.

2 endscrapers. The tools, representing 2.7 percent of the lithics in the sample, are discussed and described in the section on tools. The following discussion deals with the debitage only.

The 2,609 debitage pieces represent 20.3 percent of the total lithics recovered from the 508 square metres. This sample was then classified into stages of reduction, as presented in Table 37. The flakes account for only 30.2 percent of the total sample by number, while representing 45.2 percent of the total sample by weight. As the table indicates, the average weight of the flakes is much greater than that of the shatter, as one would expect.

The material types of the 2,609 pieces of debitage are represented in Table 38, which shows 25 different subgroups from eight major groups (see Appendix I, Table 56 for lithic descriptions). This sample contains a large proportion (76.6 percent) of quartzite, followed by small percentages of argillite (8.43 percent) and Swan River Chert (5.98 percent) which, when combined, account for 91 percent of the total sample. These lithic types are all local materials which can be, and probably were, gathered on-site.

The distribution of the 12,877 debitage pieces is presented in Table 35 and displayed in detail on lithic distribution maps (Figures 54-59). Although there are differences observed from one stone circle to another, a number of trends appear. The two rings in Group A (10 and 11) show remarkable similarities, with lithics being heavily concentrated in the centre and the northeast quarter of the rings (Figures 54 and 55). Very little material was found immediately outside the rings. The two rings in Group B (13 and 14) were also similar, with generally low frequencies of lithic debitage throughout the inside and outside. Ring 13 did show light concentration on the south side of the central hearth and near the south boundary of the ring. The two stone circles in Group C (Rings 16 and 17) revealed relatively low densities of lithics both inside and outside. Ring 16 contained three moderately dense units of lithic material outside the ring. Ring 17 had one very dense unit on the eastern, interior side, with a moderately dense concentration outside on its southeast side. Overall, the three groups of stone circles (A, B and C) showed relatively similar lithic distribution characteristics internally, and different patterns between each stone circle group.

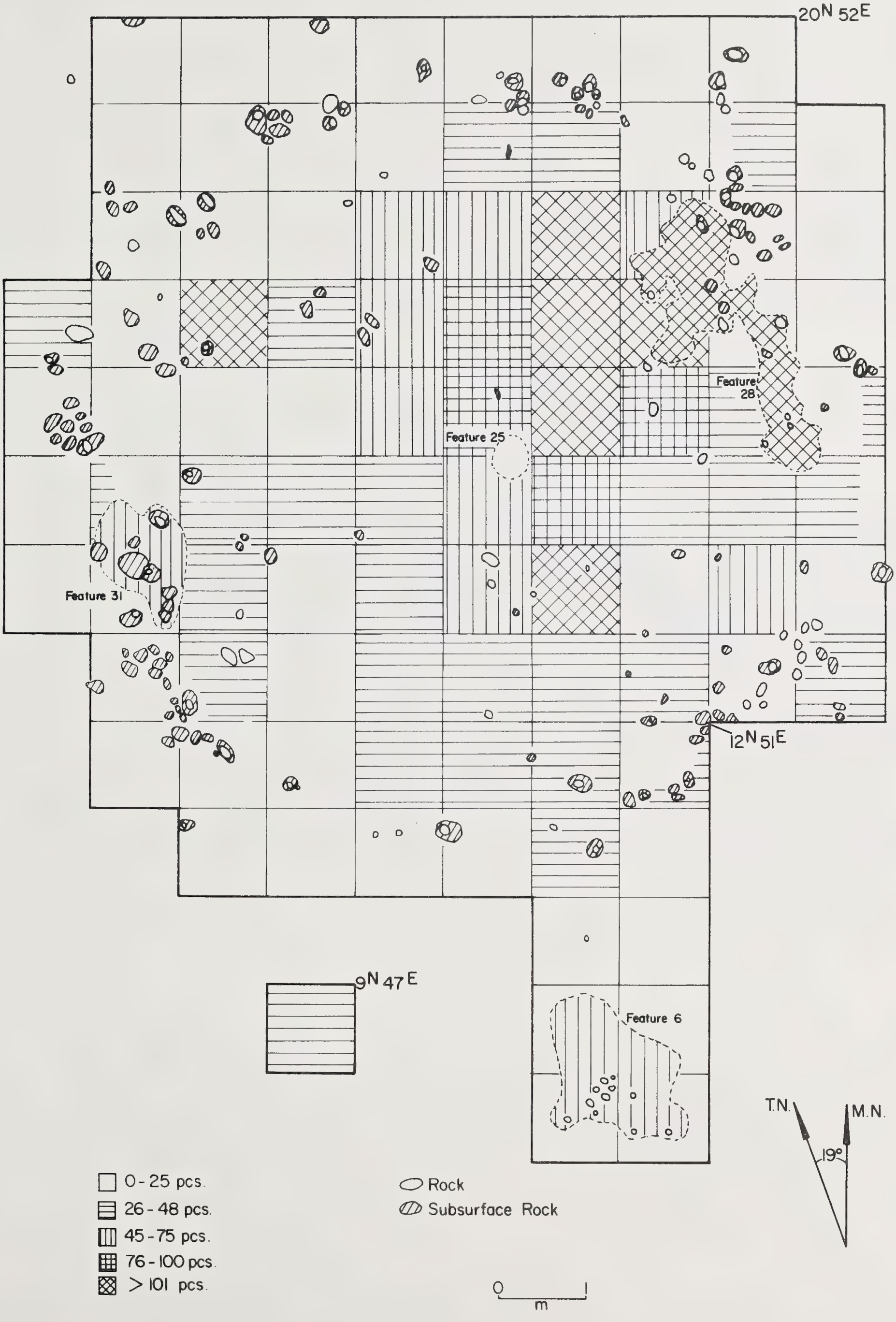


Figure 54: Density distribution by number of lithic debitage, stone circle 10, DlOp 2.

Drawn by J. Andreas.

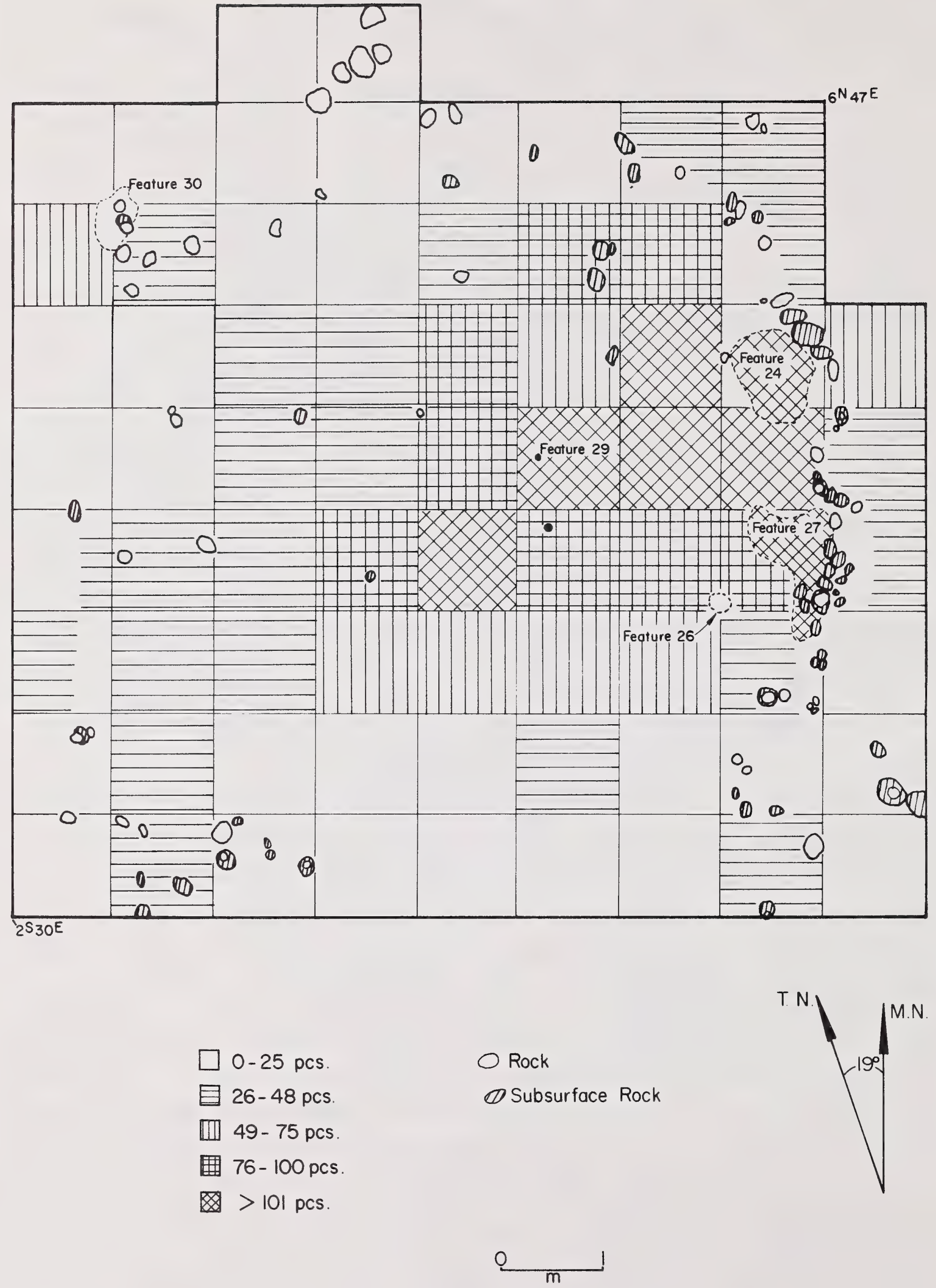


Figure 55: Density distribution by number of lithic debitage, stone circle 11, DlOp 2.

Drawn by J. Andreas.

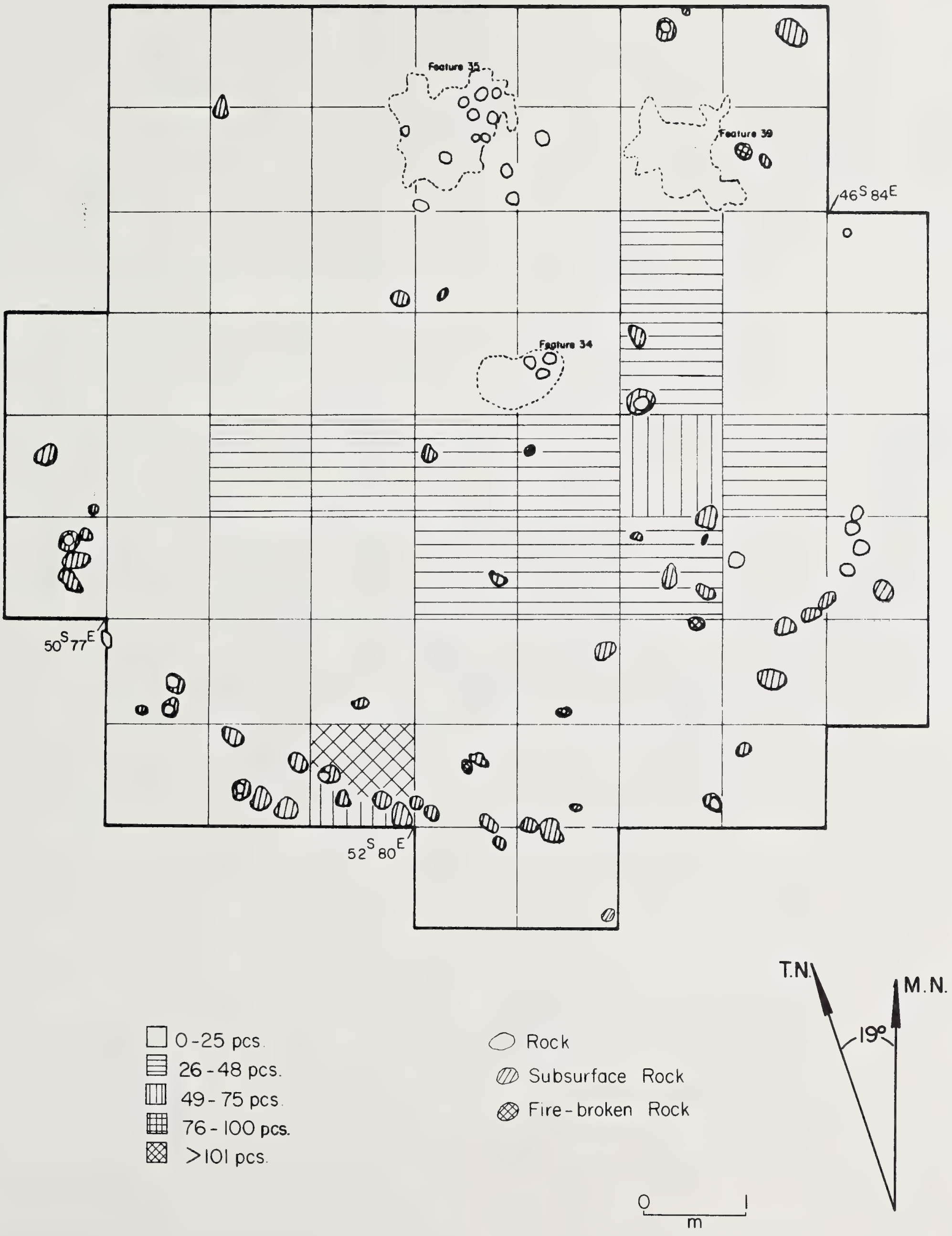


Figure 56: Density distribution by number of lithic debitage, stone circle 13, DlOp 2.

Drawn by J. Andreas.

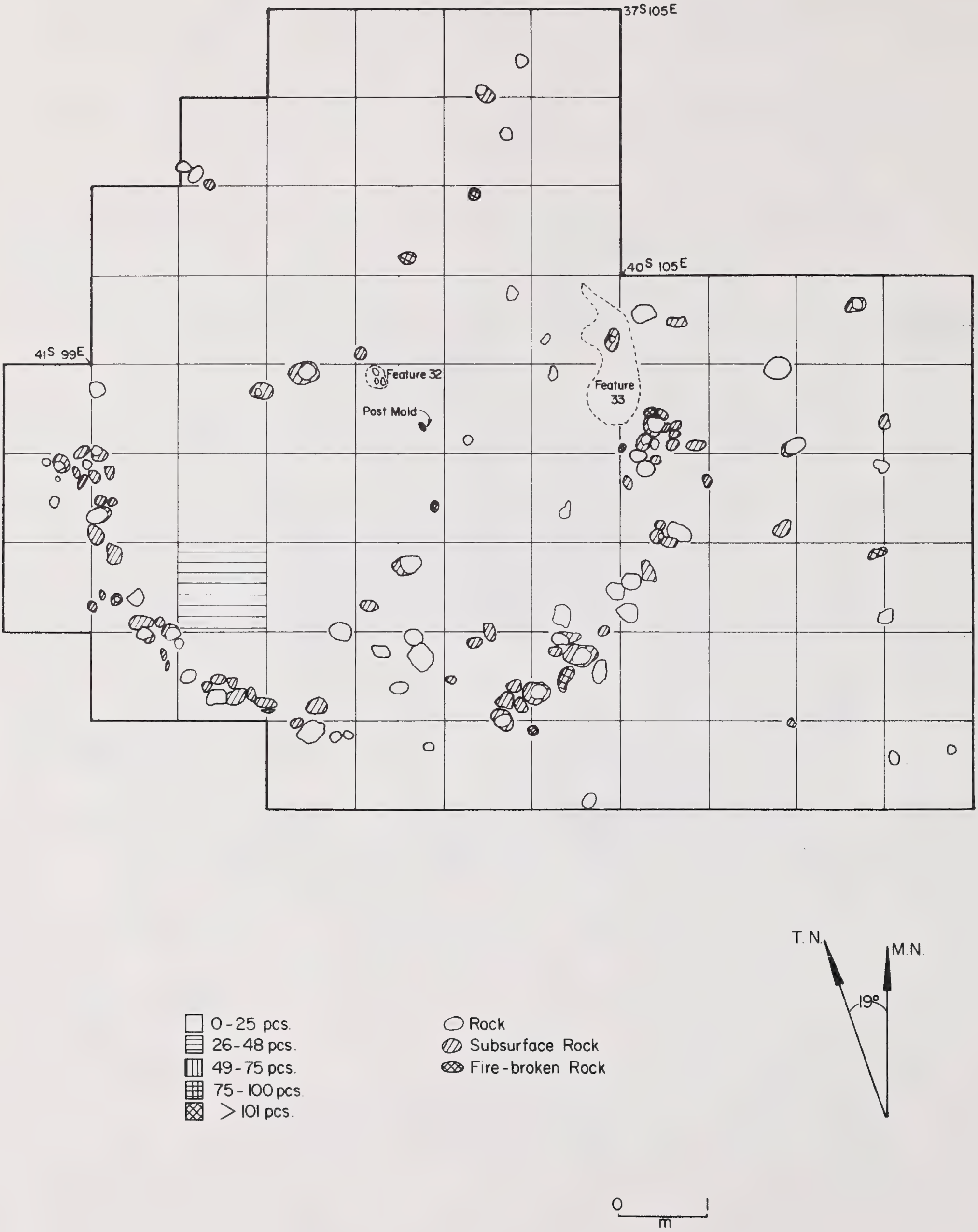


Figure 57: Density distribution by number of lithic debitage, stone circle 14, DIOp 2.

Drawn by J. Andreas

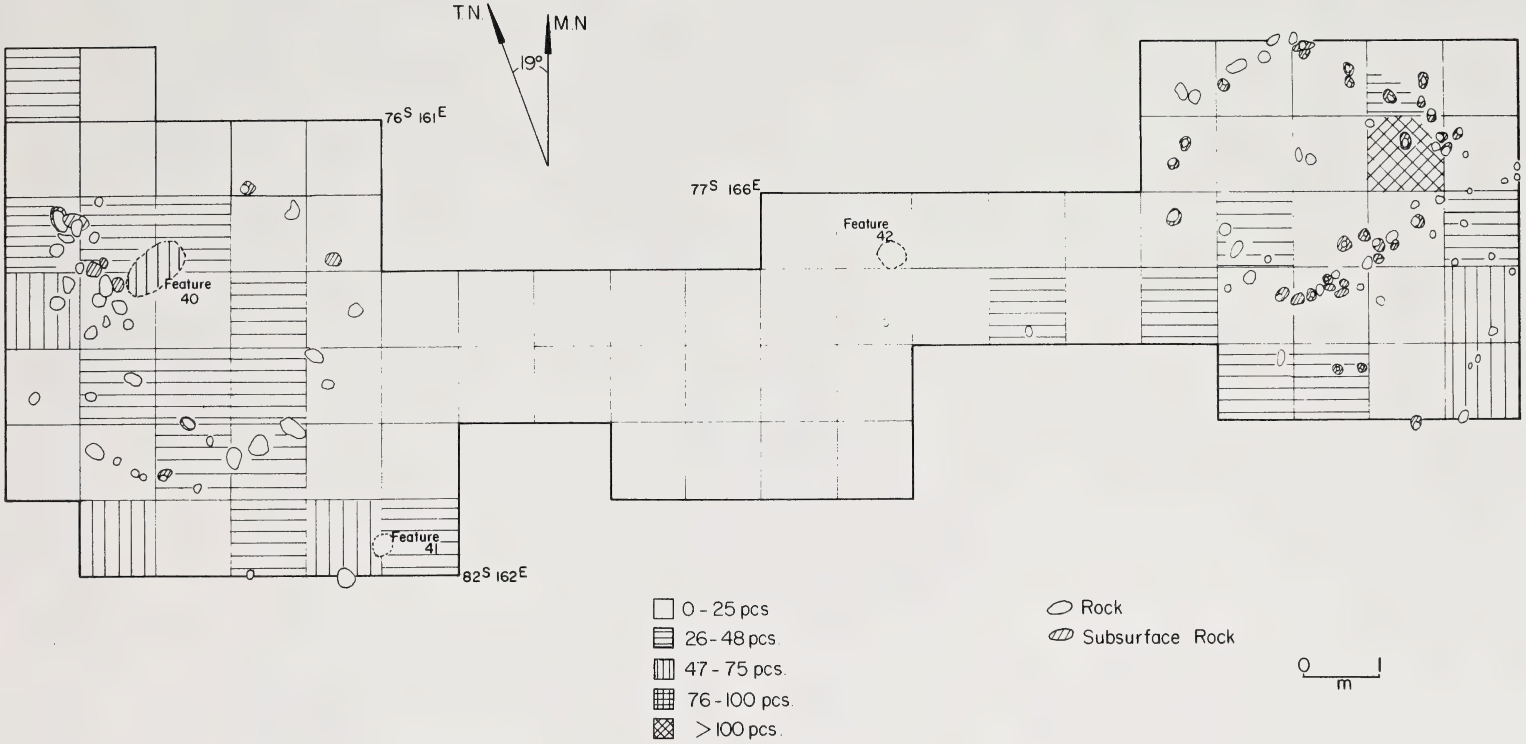


Figure 58: Density distribution by number of lithic debitage, stone circles 16 and 17, DlOp 2.
Drawn by J. Andreas.

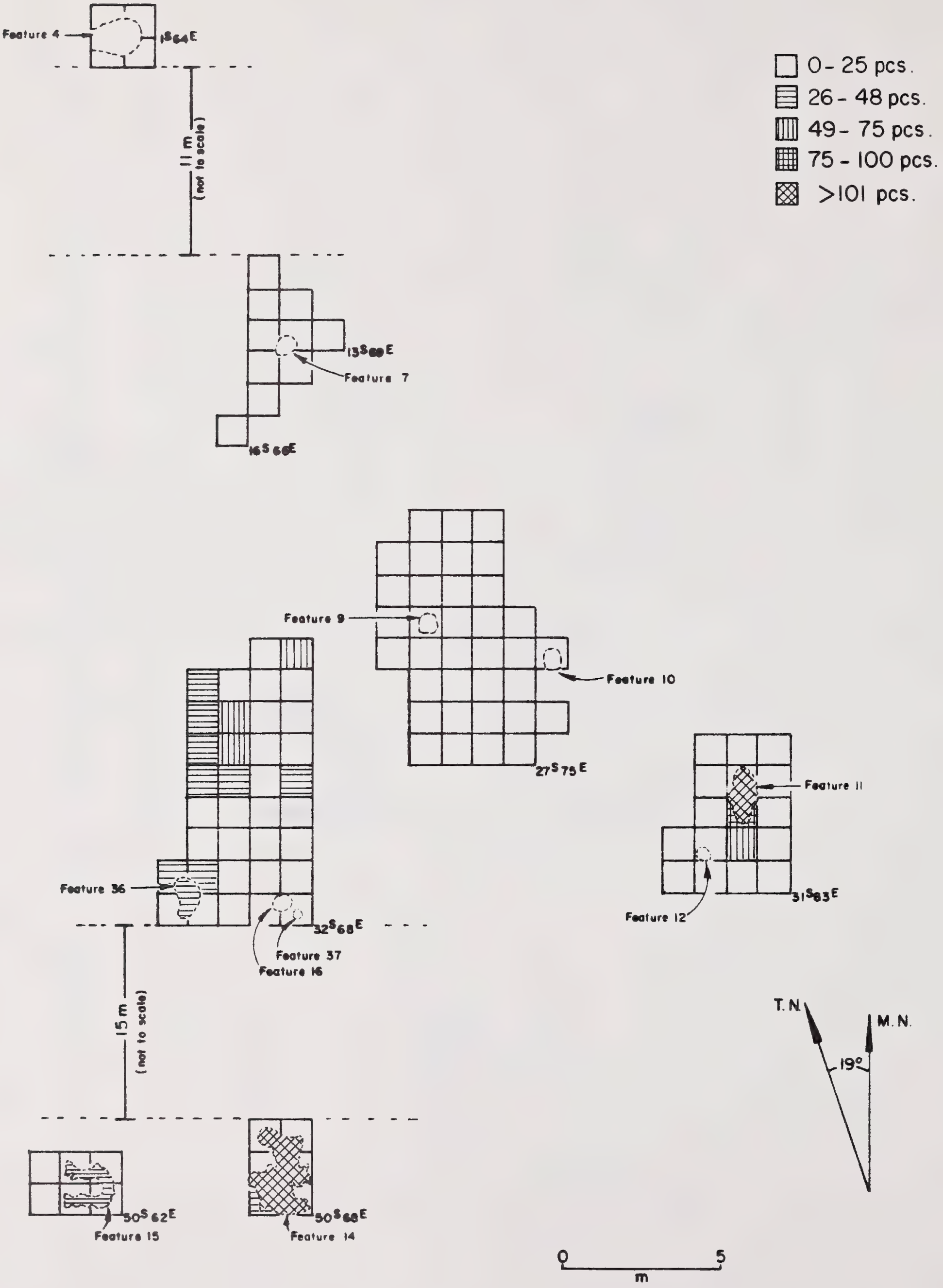


Figure 59: Density distribution by number of lithics, between stone circles, DlOp 2.

Drawn by J. Andreas.

The area between the stone circles (around the ancillary features) showed considerable variability in density, ranging from low to medium (Figure 59). It appears as though there were specific activity areas, but the sod stripping in this area could certainly have influenced the pattern observed during the excavation.

8.4.3 Tools

Some specimens recovered from the Ross Glen site were not critically examined for indications of use as tools. Consequently, only those easily recognizable as formed tools were selected for detailed analysis, including projectile points (n=13), bifaces (n=10), endscrapers (n=5), a uniface and a hammerstone.

Detailed examination of the 16 percent area sample revealed a number of other tool types, such as cores and marginally retouched stone tools (MRST). Analyses of these tools are presented for interpretation in this section, along with the recognizable formed tools. By no means does this small sample reflect all the tools present in the recovered sample. Hopefully, it will provide some general understanding of the more expendable and "low value" tools at the site.

In describing and interpreting the range of cultural material recovered from archaeological sites, one is faced with the problem of sorting materials into categories which will best allow him to answer the broad range of questions he might pose. A concept, termed here "value," has been implicit in many of the interpretive statements made and is felt to aid in a clearer understanding of what recovered cultural material represents, how better to interpret it, and how to develop more meaningful categories of cultural materials (typologies) for description and analysis. Value is considered here to represent "... that quality (or qualities) of a thing according to which it is thought of as being more or less desirable, useful, estimable, etc." (Websters 1966:1609). The value of any item or material is culturally relative and is primarily dependent on the following criteria:

1. The amount of effort expended to obtain, maintain, and/or produce the item or material.
2. Relative individual or cultural significance attached to the item or

material on which it is produced and the task or role for which it is intended or used.

Value should not be confused with importance. To give a contemporary example, in contrasting the value and importance of petroleum products in western society in 1960 and 1980, we can say that during this period the importance of petroleum products declined slightly with the added emphasis on alternate energy sources such as solar, wind and wood. However, the value of petroleum products (as reflected by price and supply) increased significantly. A number of similar examples can be presented which reflect the fact that importance and value are generally independent of one another.

In relation to aboriginal Plains Indian culture, we can say that bison, for instance, was generally of great importance as a food source throughout most time periods and in most areas. However, its value varies considerably through time and space in relation to the aforementioned criteria.

Bearing these considerations in mind, it would seem that the concept of value is so highly variable and dependent on such a variety of factors as to be of little use in an archaeological context. However, observation suggests that the form and/or relative abundance of many kinds of cultural material is best understood in terms of value and that criteria can be established to determine this value in most instances. The following general criteria are suggested to identify low value tools:

1. Generally made on situationally available and usually relatively abundant (and often low value) raw materials.
2. Generally reflect minimal or only moderate degrees of modification in order to produce their final form.
3. Generally little or no effort is made to rejuvenate these tools after dulling or limited breakage.
4. Low value tools are often produced on an "as need" basis to conduct a specific task on a specific occasion and are commonly abandoned when that task is completed. As a result, the full range of tool production, use and discard is often reflected at a single site (Brumley 1981b:128-130).

The projectile points (Figure 60, Table 39) recovered indicated that more then just Besant-style atlatl dart points were present at Ross Glen, in contrast to exclusive Besant point recovery during the 1978 assessment. The 1981 excavation revealed a large, finely crafted Bitterroot point (Figure 60:15) and a base of what appears to be a Hanna point (Figure 60:14) inside Stone Circle 13. A single undiagnostic point tip (#15888) was also recovered from inside this ring. This evidence implies that Stone Circle 13 is at least 2,000 years older than the others.

A single Oxbow projectile point (Figure 60:13) was recovered in the open area, 2 m north of Ancillary Features 16 and 36. It is quite small but closely resembles those recovered at the Southridge Site (Brumley 1981b:85). It may or may not be directly associated with the ancillary features just mentioned. Again, it does indicate much earlier occupation than previously assumed. It should also be pointed out that these four specimens were manufactured on non-local lithic materials, the three points being made from very fine quality petrified wood similar to that found throughout Montana.

The nine remaining specimens are all classified as Besant points (Figure 60:1-8). The following is a general summary of selected characteristics; individual characteristics are provided in Table 39. The range of minimum stem width is 12.9-19.3 mm with a mean of 15.5 mm. The base width ranges from 13.7-22.8 mm with a mean of 18.5 mm. Six of seven bases show dulling. Only two of the specimens were definitely made from local lithics; the remaining seven are generally thought to be derived from non-local sources in Montana. Specimen #11210 appears to have been broken diagonally across the body and then reworked, forming a short asymetrical point. Seven points came from inside Stone Circles 10, 11, and 14. Another (#19436) was immediately outside Ring 10, and one (#21496) was found on the surface in the stripped area between the stone circles. The recovery of these points inside Stone Circles 10, 11 and 14 indicates these three rings are affiliated with Besant and that the majority of ancillary features are also associated with Besant. Other evidence will be brought forth to support these ideas. No diagnostic projectile points were recovered in or adjacent to Stone Circles 16 and 17, located to the southeast corner of the site. Points 9-12 in Figure 60 were recovered during the 1978 assessment and are all classified as Besant.

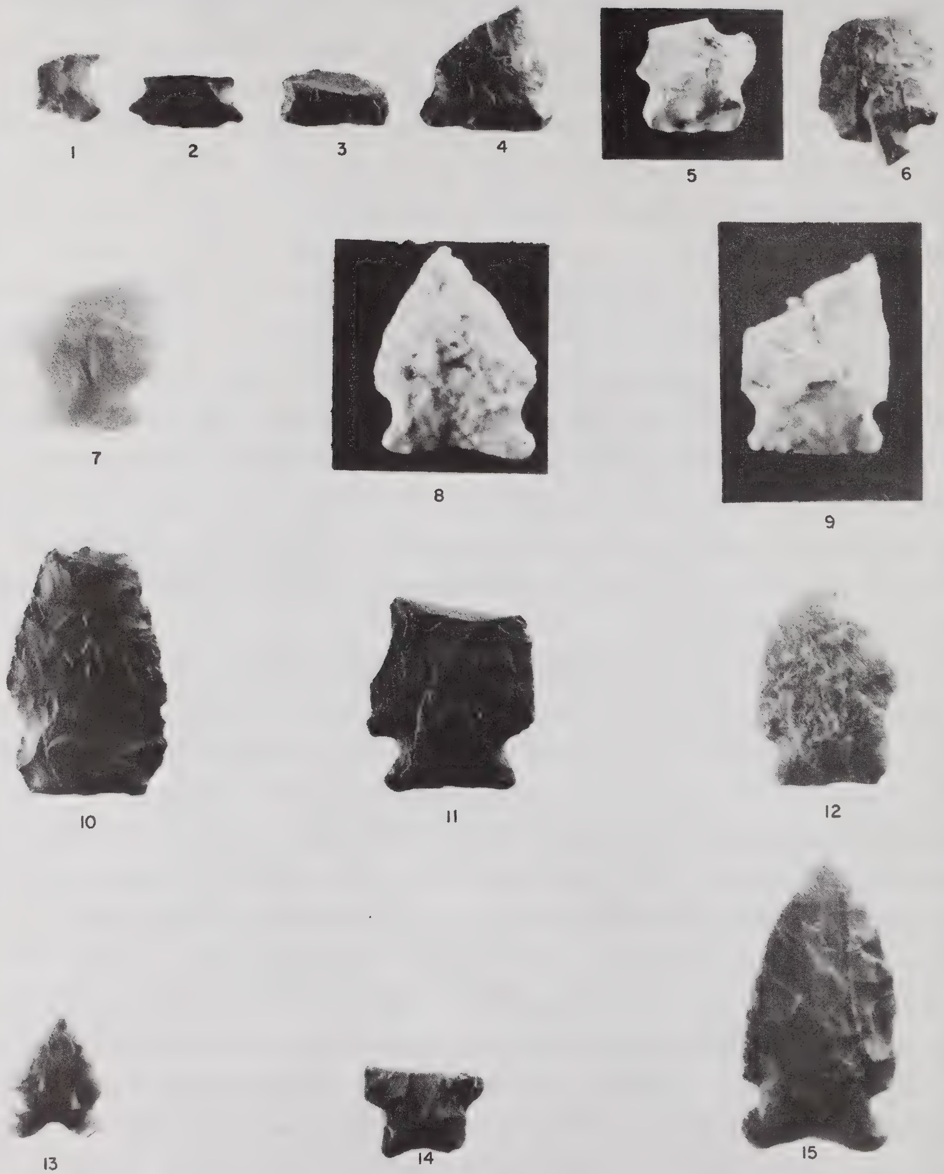


Figure 60: Projectile points from Ross Glen. Besant points 1 - 12 (16270, 13233, 14377, 11210, 19436, 16407, 21496, 16460, 2626, 4866, 674, 2625). Oxbow 13 (19735), Hanna 14 (16968), and Bitterroot 15 (14960) points.

A total of ten specimens (Figures 61 and 62) were recognized and analyzed as bifaces as a result of the 1981 excavations. Detailed attributes for individual specimens are shown in Table 40, while the following summarizes general characteristics. The overall size was the most obvious difference among the specimens with the length ranging from 19.2 to 80.0 mm (mean = 46.2 mm); the width ranging between 7.1 and 59.6 mm (mean = 30.6 mm); the thickness ranging from 4.8 to 23.7 mm (mean = 12.0 mm); and the weight varying between 0.8 and 108.5 g (mean = 25.9 g). The material types represented were dominated by local sources (n=9) with one specimen (#14374) derived from an unidentified source, probably Montana.

Only one specimen (Figure 62:2) was recovered in the vicinity of Stone Circles 16 and 17; it was found between these two rings. The slight stemming on this biface shows no signs of having served as a hafting area. The distal end, which appears slightly broken, represents the original unmodified striking platform. A single specimen (#15600) came from inside Stone Circle 13 and, thus, was associated with the Bitterroot and Hanna points.

The remaining eight specimens are believed to be associated with the Besant occupation. Three specimens (#14781, 14374, 13850), all broken, were recovered from inside Stone Circle 11. Another broken specimen (#16464) was recovered from inside Stone Circle 14. Three of the above four specimens were found immediately adjacent to the refuse piles in these stone circles. Two (#19552 and 19385) of the three bifaces noted from outside the stone circles were located 5-6 m north of Features 16 and 37 in the stripped area. The author interprets this distribution as indicating that these tools were used both inside and outside the stone circles and, when broken, were simply discarded into the refuse piles. Bifaces are believed to indicate secondary and tertiary meat processing at Ross Glen. The frequency implies that these tools were made and left here because they were needed locally but were not worth transporting. Many of the specimens pictured in Figures 61 and 62 were recovered during 1978 assessment (see discussion in early sections).

Only five endscrapers (Figure 63:3, 4, 10, 12, 16) were recovered from the 1981 excavations. Detailed characteristics of each specimen are provided in Table 41 and summarized below. All these specimens are small

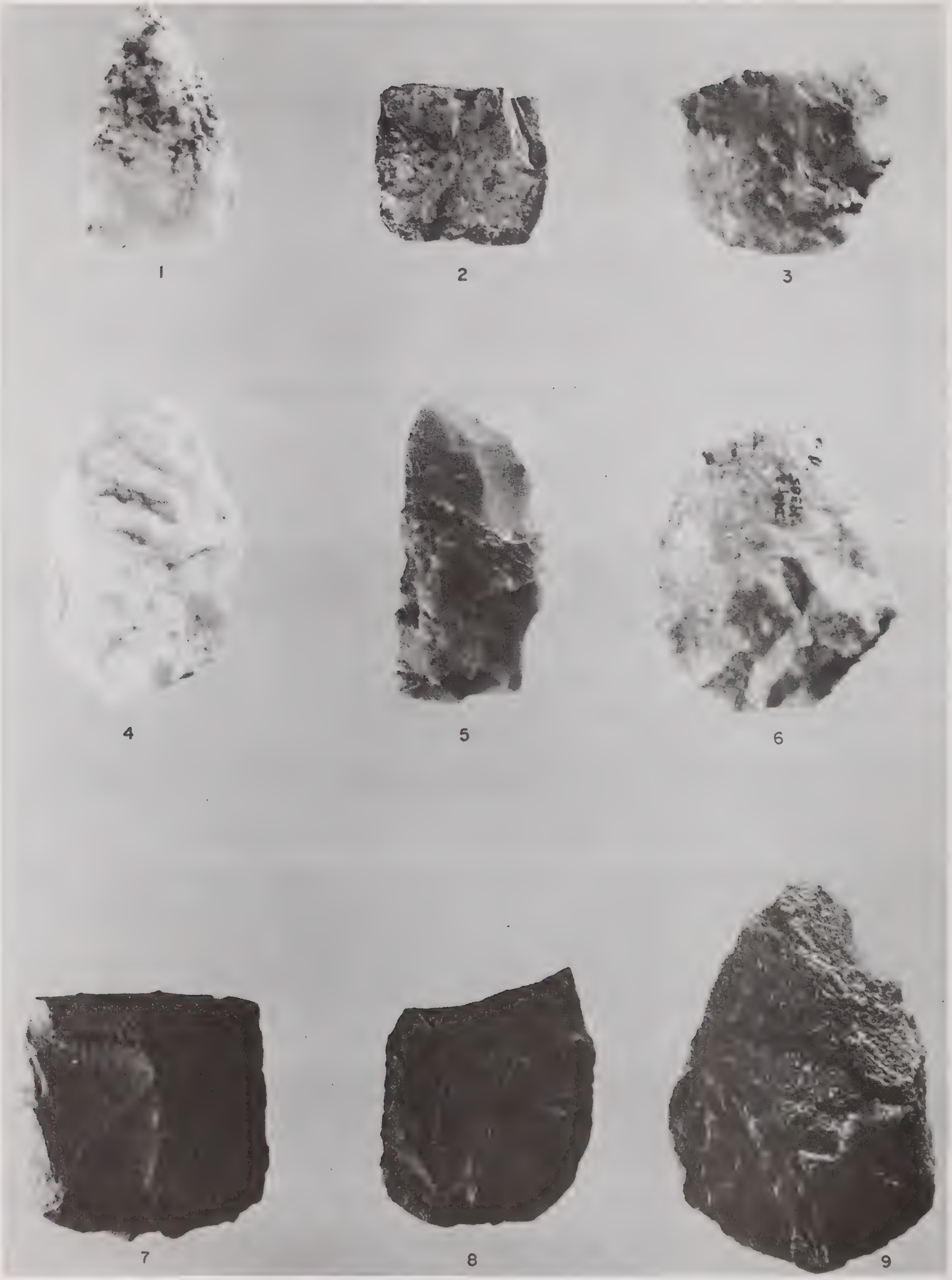


Figure 61: Besant bifaces from Ross Glen (3573, 13850, 8509, 21495, 14374, 19385, 8510, 14781, 1093).

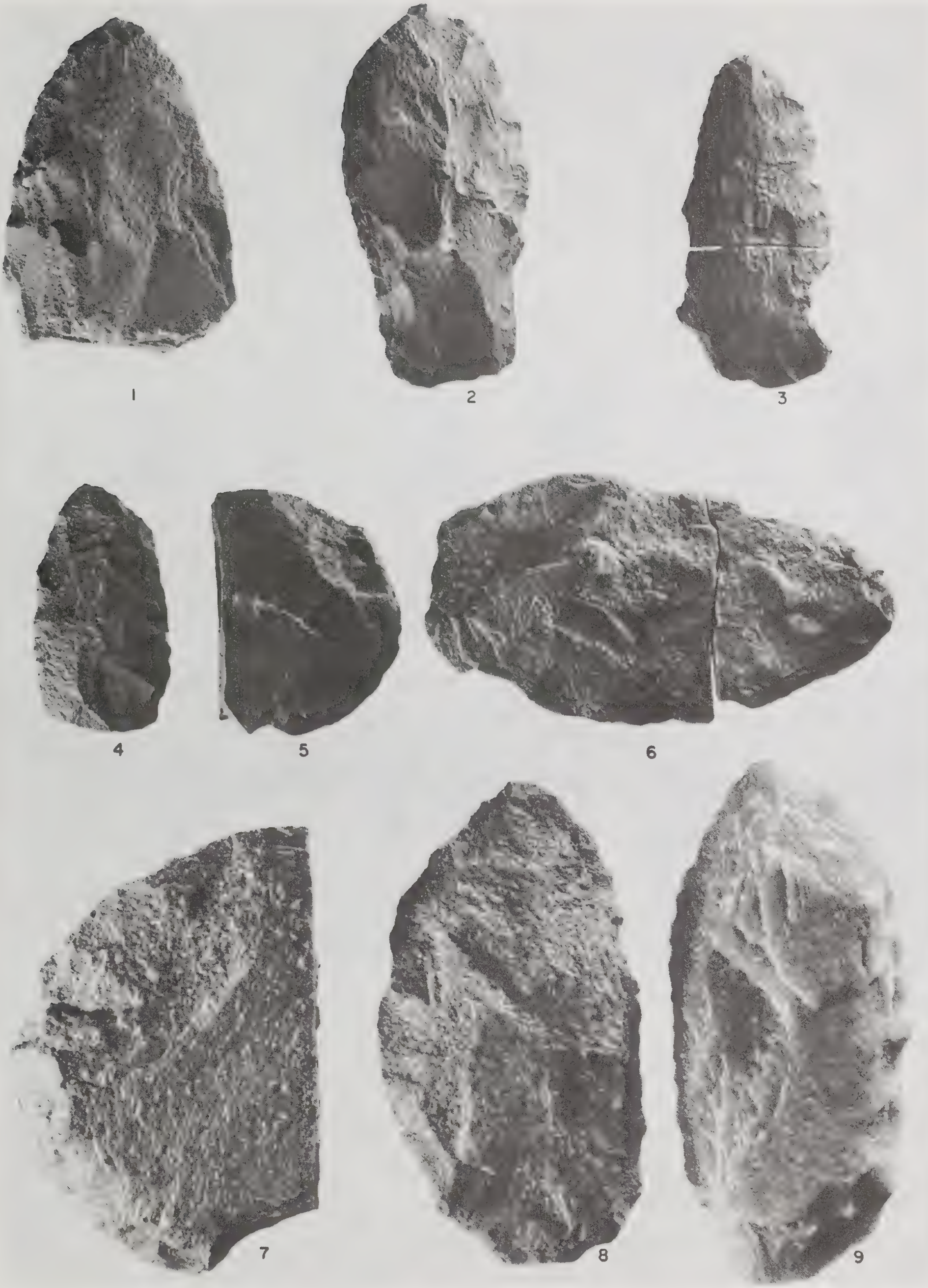


Figure 62: Bifaces from Ross Glen (673, 18716, 2930/3075, 4098, 4408, 4402/4403, 4870, 2634, 4872). All are probably Besant with the exception of #2 (artifacts are 80% of actual size).

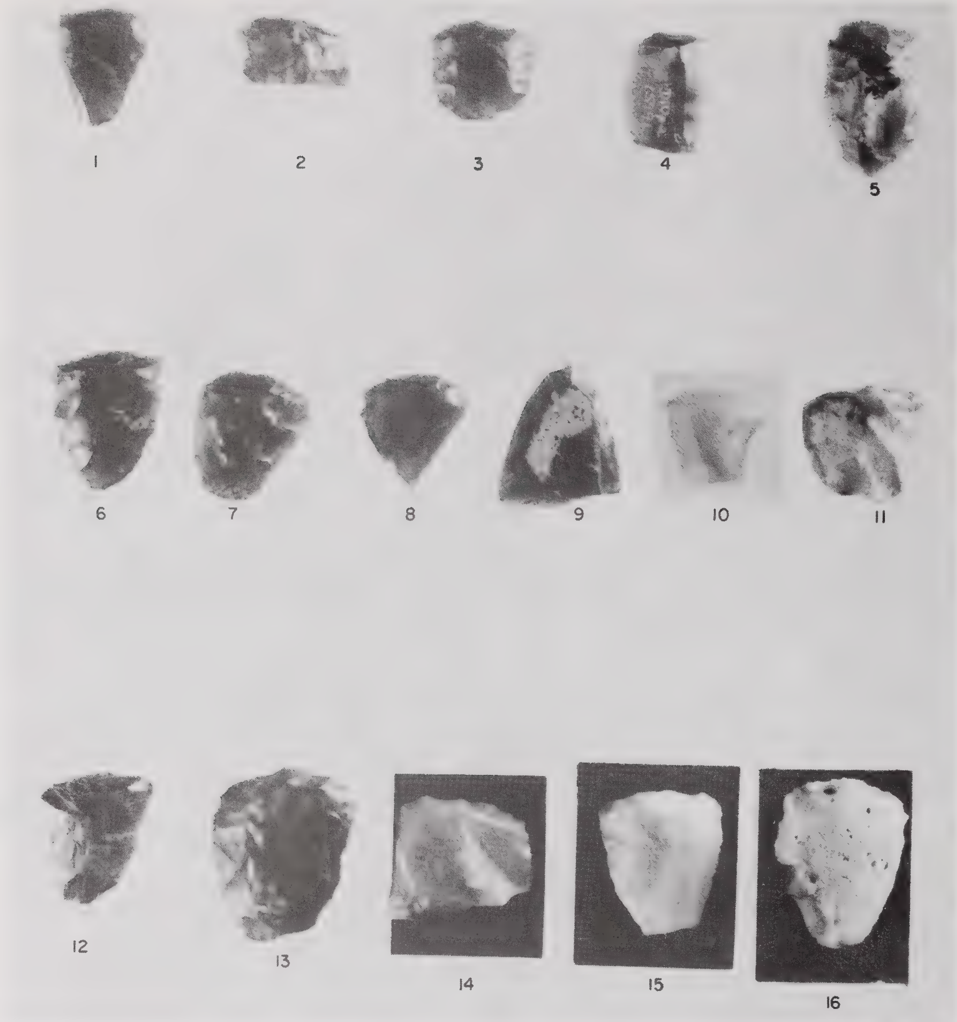


Figure 63: Endscrapers recovered from Ross Glen (1495, 1045, 16522, 15996, 4867, 2633, 1344, 3967, 4514, 16027, 2379, 11911, 2631, 4441, 4876, 9398). Scrapers 4 and 10 were in Stone Circle 13, associated with the Bitterroot point.

and similar to those previously recovered. The lengths range from 15.1 to 25.5 mm (mean = 19.1 mm), while the width varies from 13.3 to 21.2 mm (mean = 17.1 mm). Thickness is between 5.8 and 17.0 mm (mean = 8.2 mm), and the weight ranges from 1.5 to 4.3 g (mean = 2.2 g). The height of the working edge varies from 5.6 to 7.0 mm (mean = 6.1 mm), while the length of the working edge is between 12.4 and 20.0 mm (mean = 16.1 mm). Three of the specimens were fashioned from tertiary flakes, one from tertiary shatter, and one from a secondary flake (pebble preform). Non-local lithics (two of Knife River Flint and two of Montana Chert) were preferred over locally available materials.

Two endscrapers were from excavated Stone Circle 13 (Figure 63:4 and 10) - one (#16027) outside the circle and the other inside. While the material types were the same as for the assumed Besant specimens, these endscrapers differed slightly by having little or no retouch along either lateral edge, no dorsal thinning, but having a pronounced axis.

The other three endscrapers were found inside Stone Circles 10, 11 and 14, respectively. Only specimen #9389 (Figure 63:16) does not represent the kind of well-crafted endscraper manufactured from non-local material that typifies other Besant specimens excavated during both years of investigations.

Small size, coupled with specimen completeness, implies that these tools were no longer usable in this state and, accordingly, explains their presence at the site. As the majority were recovered inside the stone circles, it is apparent they were generally used within the structure. The selection of non-local material types for these tools could reflect either functional or aesthetic preferences. It may also imply a link (via travel or trade) between these people and areas to the south and east (North Dakota quarries). Hide scraping activities were certainly undertaken at Ross Glen, as indicated by the presence of these tools.

The single, easily recognizable hammerstone (#15560) is a heavily water-worn quartzite cobble (Figure 64). It weighs 1,400 g, measures 165.1 mm in length and 103.9 mm in width, and has a thickness of 63.1 mm. Its overall shape is that of a pear with a narrower neck and wider bottom. The bottom displays three crushed areas, and two major flake scars extend up the ventral surface. The top shows light wear and

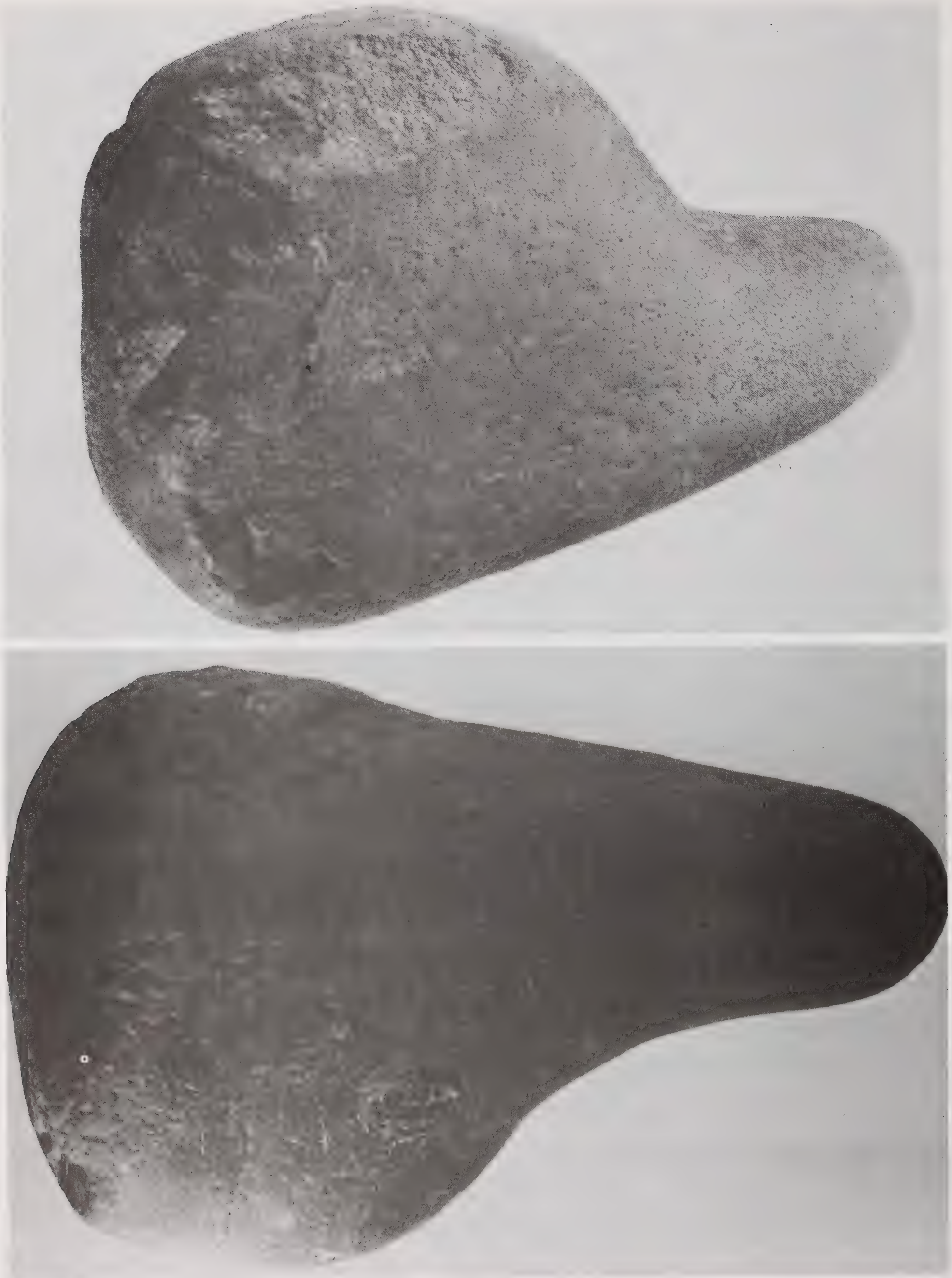


Figure 64: Views of crushing on the hammerstone (artifacts are 85% of actual size).

pitting. The dorsal surface reveals some lightly pecked areas, as does the flat ventral surface. This tool was used both as a hammer and an anvil. It was located inside Stone Circle 13 (50s18e). Consequently, it is associated with the oldest, non-Besant occupation.

A single uniface (Table 42) was recognized from the area immediately adjacent to Stone Circle 16 and, thus, was not associated with the Besant occupation. It probably served as a cutting instrument but, because of its overall low value, was discarded following the occupation.

A total of 63 marginally retouched stone tools (MRST) were identified during analysis of the 2,609 lithic debitage pieces in the 16 percent area sample. Table 43 displays the detailed characteristics of each specimen. The following is a general summary of a few selected attributes. Figure 65 shows a small sample of these tools.

The overall lengths range from 12.8 to 168.7 mm (mean = 71.4), with widths of between 9.0 and 113.6 mm (mean = 48.7 mm). Thickness ranges from 2.2 to 62.0 mm (mean = 20.6), and weight varies from 0.3 to 849.5 g (mean = 135.3 g). Thus, a large size range is depicted in this sample. Most of these tools showed only one modified edge (n=43), while fifteen had two edges, and five had three edges. These modifications were performed on a variety of preforms, including primary flakes (n=9), secondary flakes (n=11), tertiary flakes (n=5), primary shatter (n=13), secondary shatter (n=12), tertiary shatter (n=11), and cobble forms (n=2). It does not appear that any specific stage of manufacturing was being selected, although 78 percent were manufactured on local quartzite materials. Only two specimens (3.2 percent) appear to represent non-local lithic types. Given the low value of these tool types, coupled with easy production, most of these tools were produced on-site for the group's immediate needs and were likely discarded upon finishing the task at hand.

In contrast to projectile points and endscrapers, the MRST were located primarily outside the stone circles (65 percent). Stone Circle 13 had only one tool located inside the ring. Six MRST were discovered in Stone Circles 16 and 17, while sixteen more were found outside these two rings. The MRST just mentioned may not be associated with the Besant occupation. Nearly 60 percent of the Besant specimens were found away from the stone circles in the area of the ancillary features. Marginally

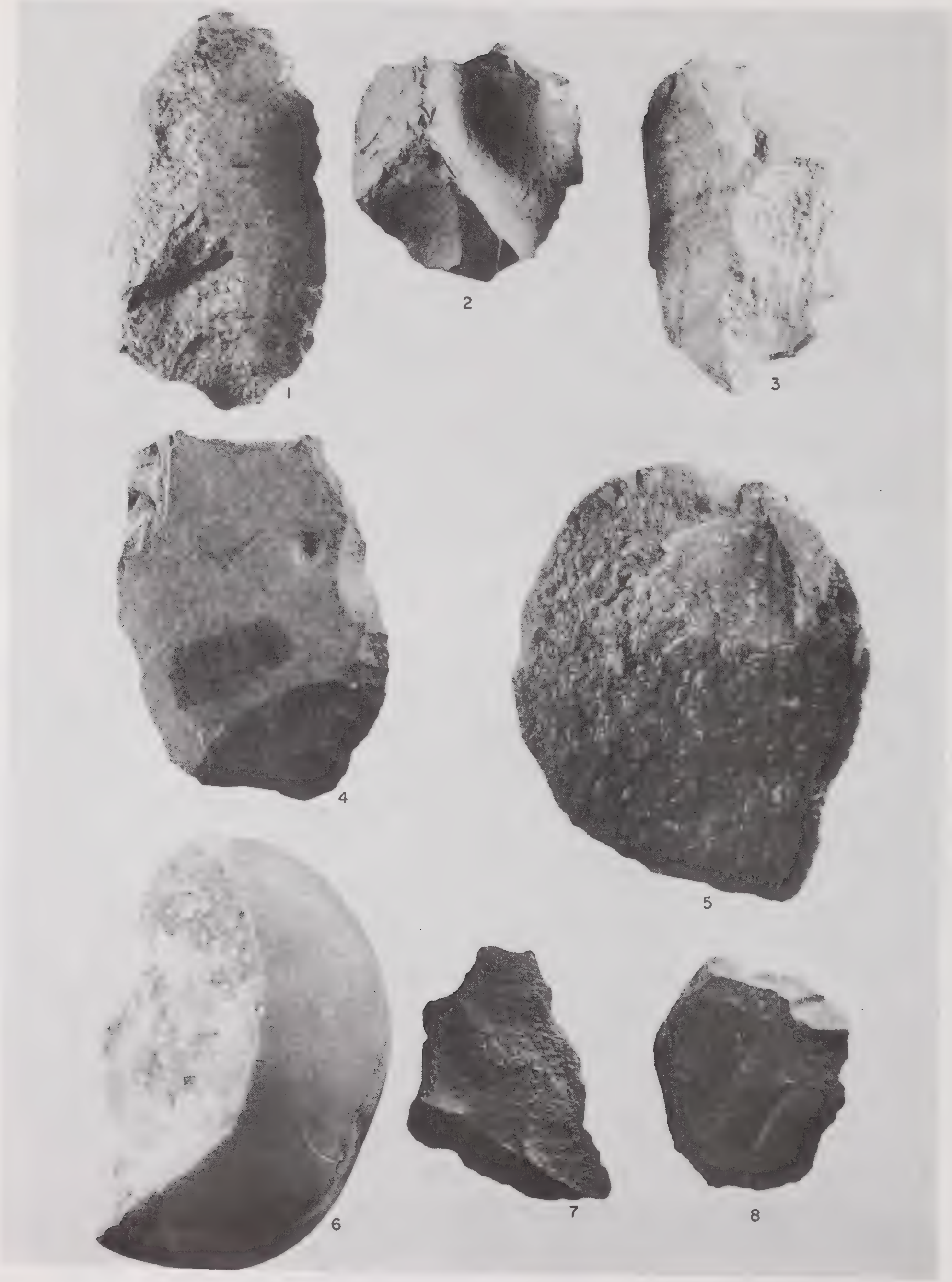


Figure 65: Marginally Retouched Stone Tools 1 - 8 (19757, 18575, 13724, 19751, 13379, 18360, 17467, 13729).

retouched stone tools were principally related to various cutting activities. Thus, it is assumed that meat and hides were being processed with these tools and that the activity took place (for the most part) outside the stone circles.

Twenty-four cores (Figure 66) were recognized from the 2,609 pieces of lithic debitage included in the 16 percent sample. Table 44 provides the details of each core, and a general summary of selected characteristics is given below. These cores are principally manufactured of local quartzite and argillite (83 percent), with preforms of cobbles (n=12) and shatter (n=9) dominating. Overall lengths range from 53.7 to 220.0 mm (mean = 123.6 mm), with widths of between 24.2 and 192.8 mm (mean = 91.3 mm). Thickness varies from 15.0 to 152.6 mm (mean = 51.6 mm), and the weight ranges from 20.1 to 7100 g (mean = 1093.0 g). As one can see, there is an extensive size range involved. Generally, the cores show only one (n=10) or two (n=9) platforms, while a few have up to four platforms. This occurrence implies minimal flaking was done on any one particular piece, which could easily be attributed to the abundant supply of raw material readily available at Ross Glen. One core (#18642) also displays unifacial retouch along one edge which is not associated with the platform. Another specimen (#20532) shows use as an anvil, with crushing and pit marks, and was undoubtedly used in the bipolar knapping technique. Only one core (#18526) was identified as a bipolar core. In many instances, it appears that a cobble was selected and broken open only to examine the quality of material and then discarded.

Although one might anticipate that tool manufacturing and cobble reduction would have been conducted outside the stone circles, the evidence does not support this; most (67 percent) of the cores were discovered inside the rings. Eight were from inside Rings 16 and 17, while only three were recovered between these same two rings. Two were also discovered inside Stone Circle 13 and none immediately outside it. Again, these thirteen cores are not associated with the Besant occupation. Only two of the remaining eleven cores were found in or around the ancillary features away from the stone circles.

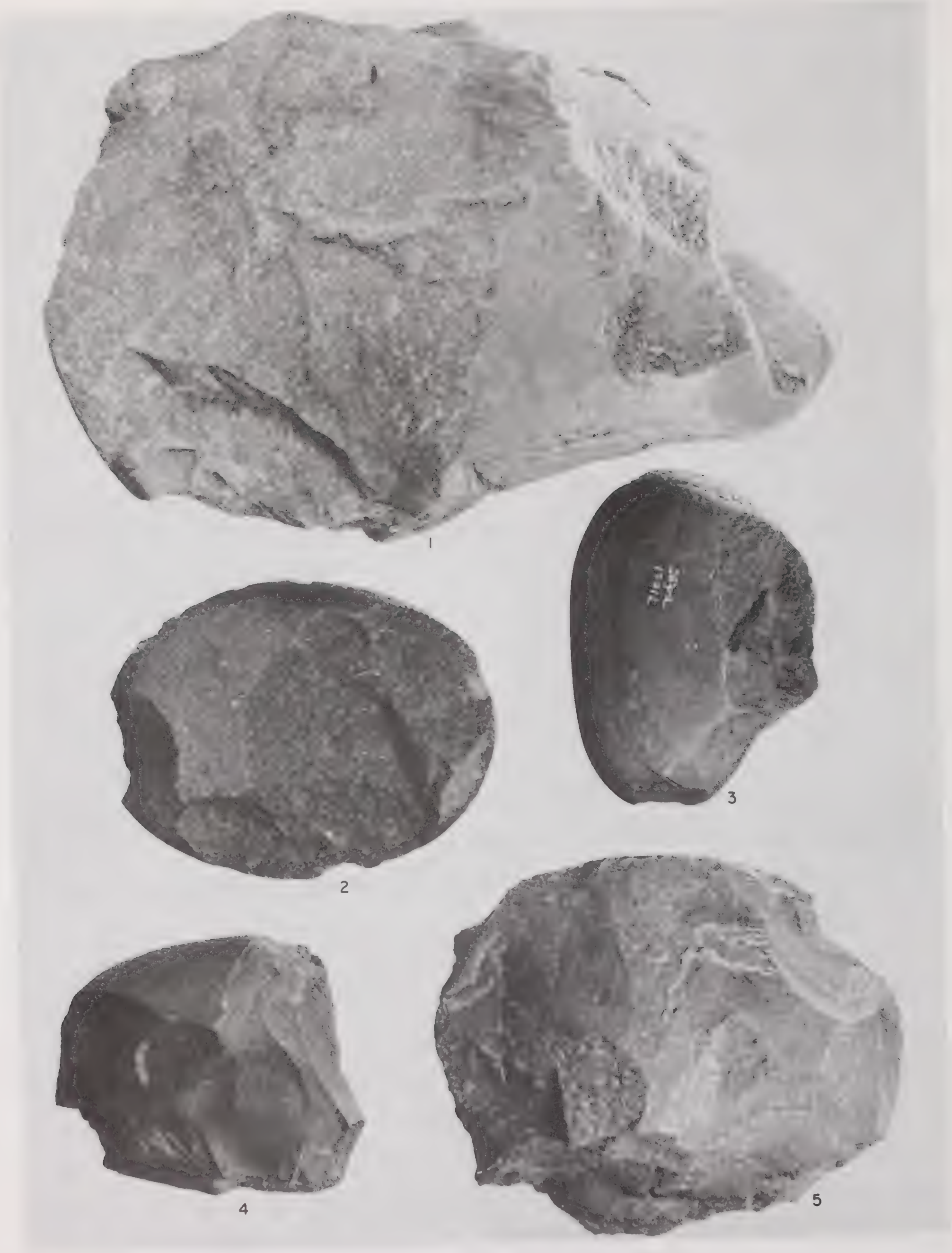


Figure 66: Cores 1 - 5 (14901, 18526, 17012, 17285, 17205) (artifacts are 75% of actual size).

8.4.4 Fire-broken Rock

This material was observed both in specific clusters (ancillary features) and scattered over the area. A total of 13,302 pieces were recovered, weighing 954,601.2 g. Their distribution averaged slightly more than 26 pieces/square metre. This is deceiving, however, since 39.2 percent (5,208 pieces weighing 650,567.59 g) of the total fire-broken rock occurred in recognized ancillary features (Table 45). These features were located both inside and outside the stone circles. A total of eight features inside the stone circles contained 2,766 pieces weighing 345,320.7 g. The latter figures represent 43.8 percent and 67.3 percent, respectively, of the total FBR recovered inside the stone circles. Outside the stone circles were found 6,983 pieces of fire-broken rock (weighing 441,333.7 g) and, again, 35 percent (2,442) of that was located within features. Thus, some 5,208 pieces weighing 650,567.5 g were located within features, while 8,094 pieces weighing 304,033.5 g were scattered elsewhere over the site (Table 45). Interestingly enough, the average weight (125 g) of the stones inside the features was heavier than the average weight (37.6 g) for the scattered material. In comparing average weight of specimens on the inside of stone circles (81.2 g) to that of the outside (63.2 g), there is no significant difference. On a simple average-per-square-metre basis, the inside of the rings (31.4/square metre and 2,547.2 g/square metre) showed a denser concentration than the outside areas (22.8/square metre and 1,440 g/square metre).

Given the above figures, the author interprets the discovery of quantities of fire-broken rock, both scattered and in specific features, as representative of the extensive food processing that occurred inside the stone circles. The types of features recorded inside and outside indicate that actual boiling took place outside. The author believes there are other possibilities, unknown at the present time, to account for the quantity of FBR inside the stone circles.

The distribution of fire-broken rock in ancillary features scattered over the site is quite interesting (Table 45). The ancillary features termed fire-broken rock piles and refuse piles will be discussed first. These ancillary features were primarily located inside the stone circles on the east or northeast quarter of all Besant rings (10, 11, 14) and were also present in the one Bitterroot stone circle (13). In the Bitterroot stone circle, the feature was on the north boundary. The two rings in Group C (16 and 17) did not yield these types of features. Consequently, the observed pattern of ancillary features containing quantities of fire-broken rock appeared culturally influenced. They were similar in Group A and B and were only in those rings determined to be Besant.

Examining the overall distribution of fire-broken rock not in specific ancillary features showed other significant patterns (Figures 67-72). Group A rings (10 and 11) showed heavy concentrations in the northeast section of the stone circles, principally inside and around the designated ancillary features (Figures 67 and 68). The two rings in Group B (13 and 14) showed some differences (Figures 69 and 70). Ring 13, containing the Bitterroot and Hanna points, revealed a moderately dense concentration of scattered fire-broken rock on the eastern, interior portion of the ring. The rest of the ring had a relatively low, even scattering. On the other hand, Ring 14 (Besant) did not exhibit the same pattern as the other Besant rings in Group A. It had a medium concentration just south of ring center and a very light overall scatter throughout the rest of the area. The exception was one dense unit located outside the eastern side of the ring. The two rings in Group C (16 and 17) showed somewhat different patterns (Figure 71). Ring 16 had a heavy concentration near the center of the ring, with a medium concentration outside the southern wall and the north wall (Figure 71). Ring 17 had one unit containing relatively high artifact densities, located just outside the east margin. Ring 17 had relatively low densities throughout the rest of the area in and around it (Figure 71).

Generally speaking, there was an overall tendency for fire-broken rock to be on the east side, with occasional concentrations near the center. The two Besant rings in Group A (10 and 11) showed remarkable similarities, while the one Besant ring in Group B (#14) has some similarities to these but with less fire-broken rock. Ring 13 had considerable fire-broken rock, as did Rings 10 and 11, but it was more evenly distributed. The two rings in Group C showed only minor similarities to the Besant stone circles.

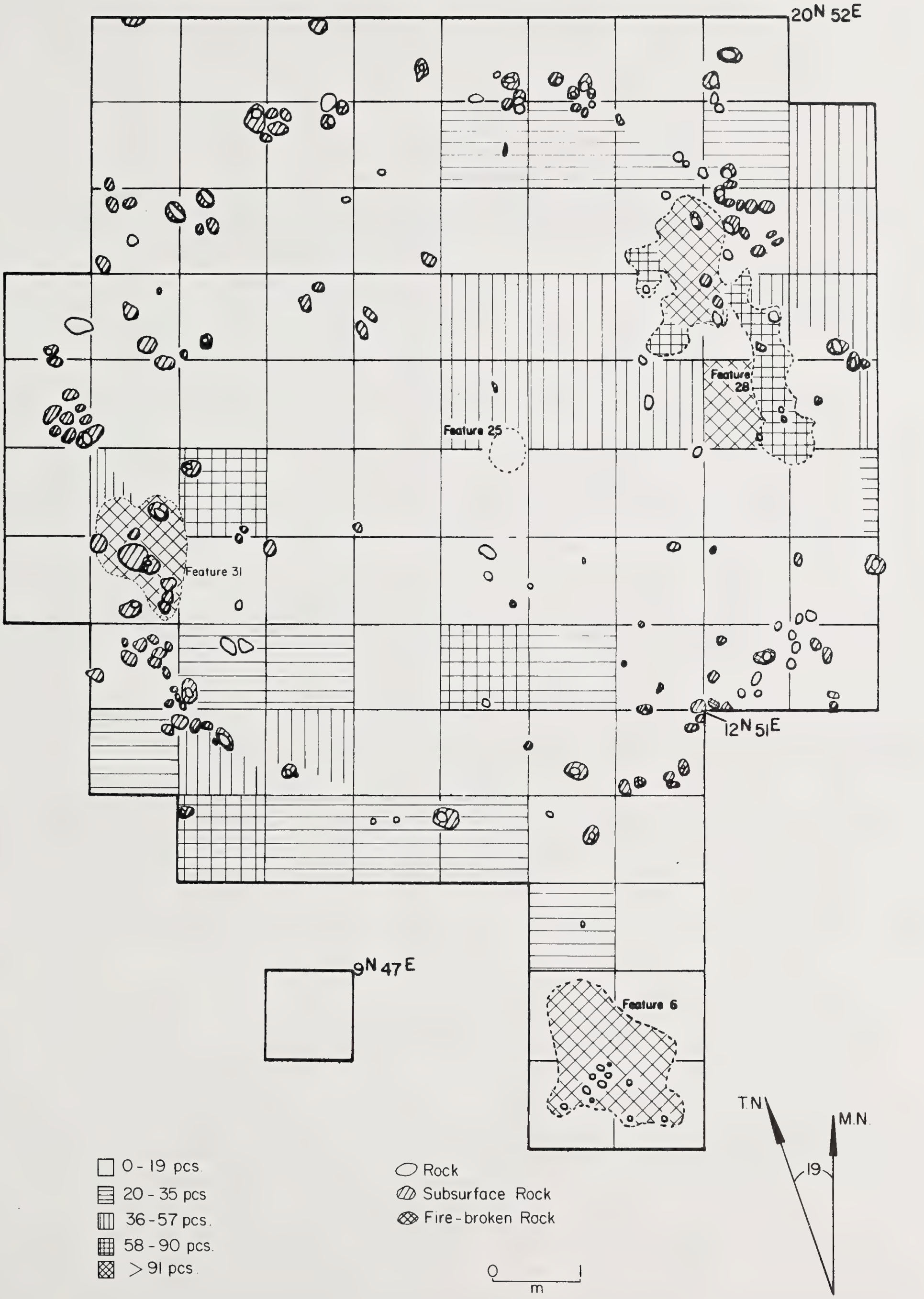


Figure 67: Density distribution by number of fire-broken rock, stone circle 10, DIOp 2.

Drawn by J. Andreas.

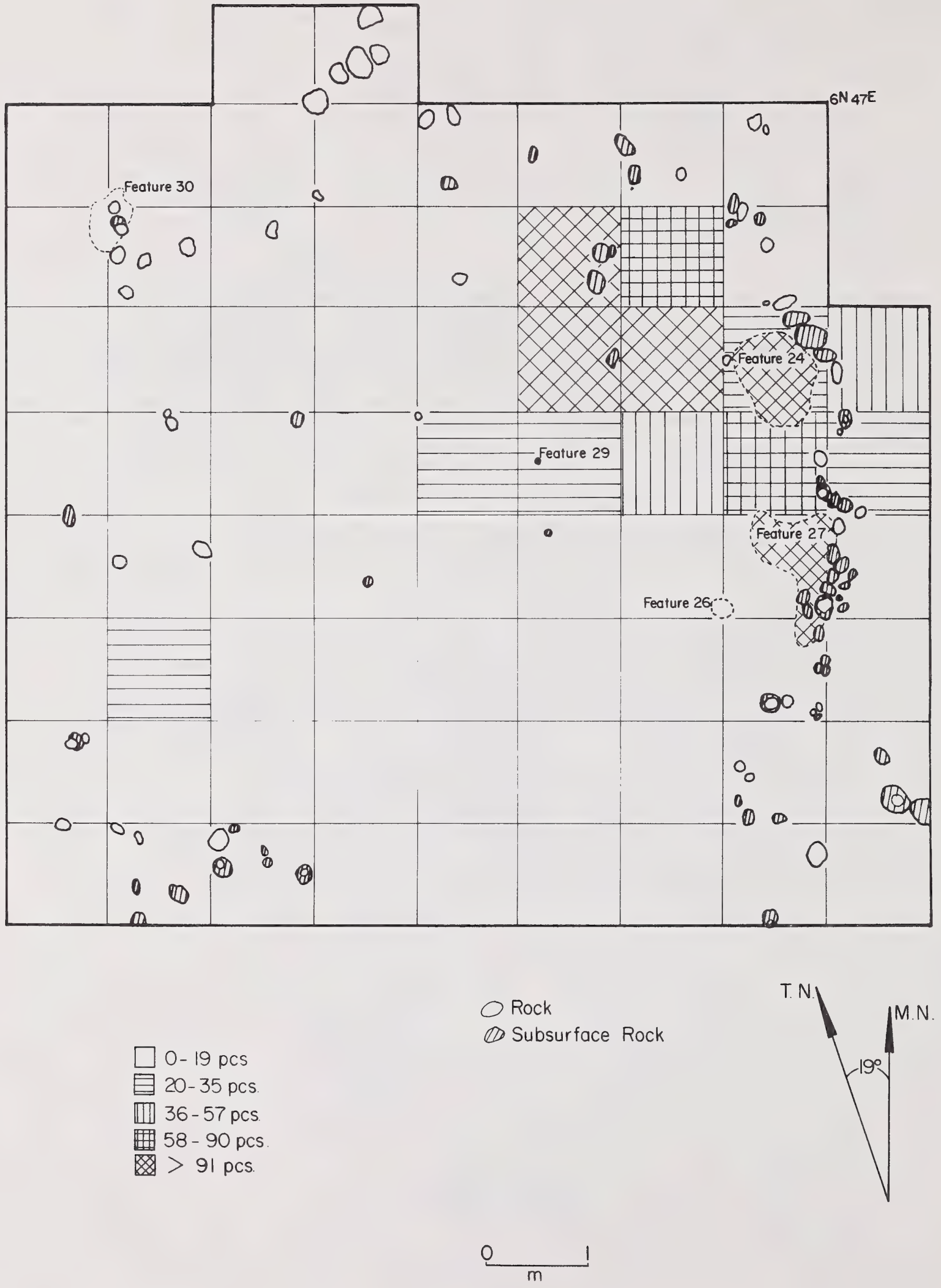


Figure 68: Density distribution by number of fire-broken rock, stone circle II, DIOp 2.

Drawn by J. Andreas.

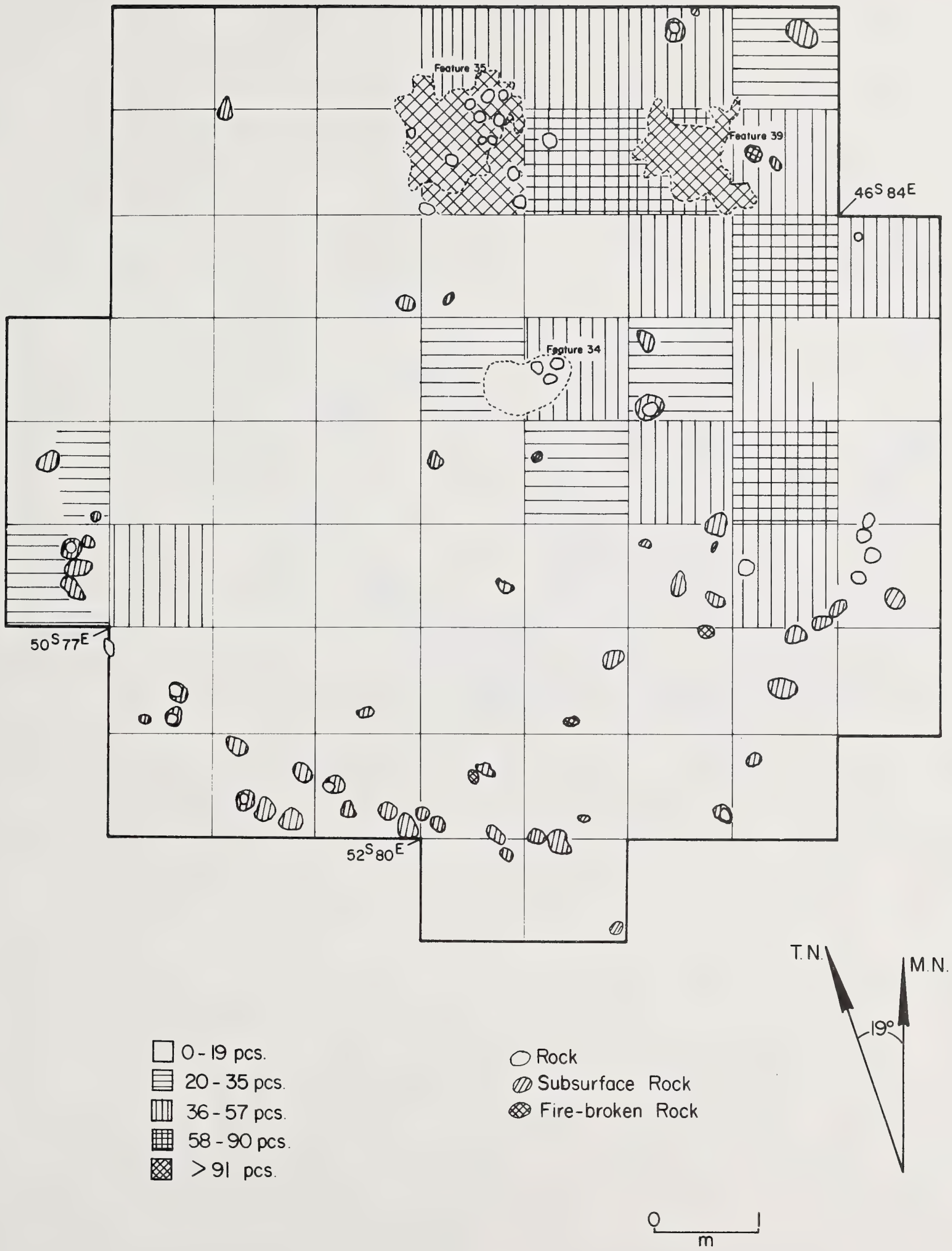


Figure 69: Density distribution by number of fire-broken rock, stone circle 13, DlOp 2.

Drawn by J. Andreas.

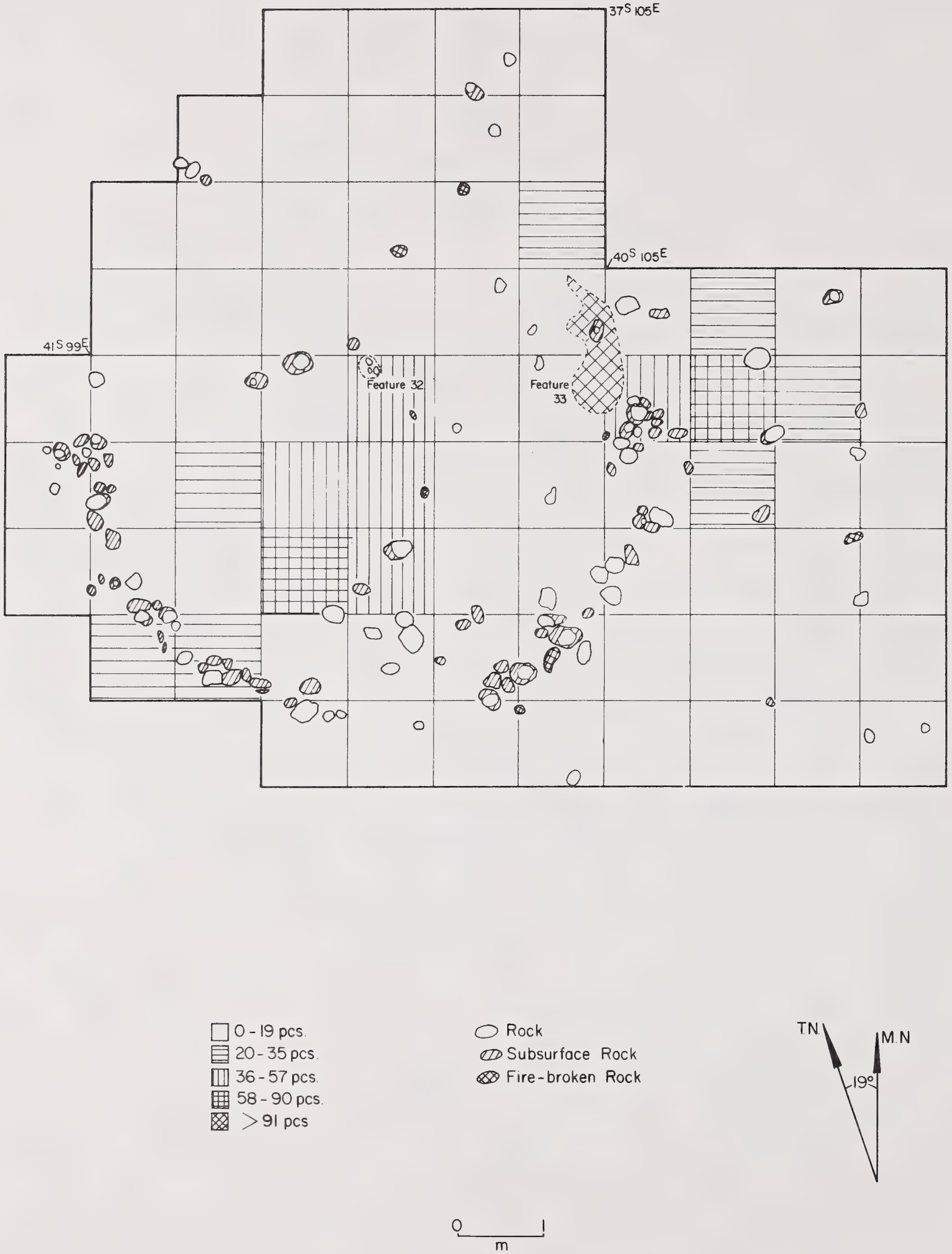


Figure 70: Density distribution by number of fire-broken rock, stone circle 14, DlOp 2.

Drawn by J. Andreas.

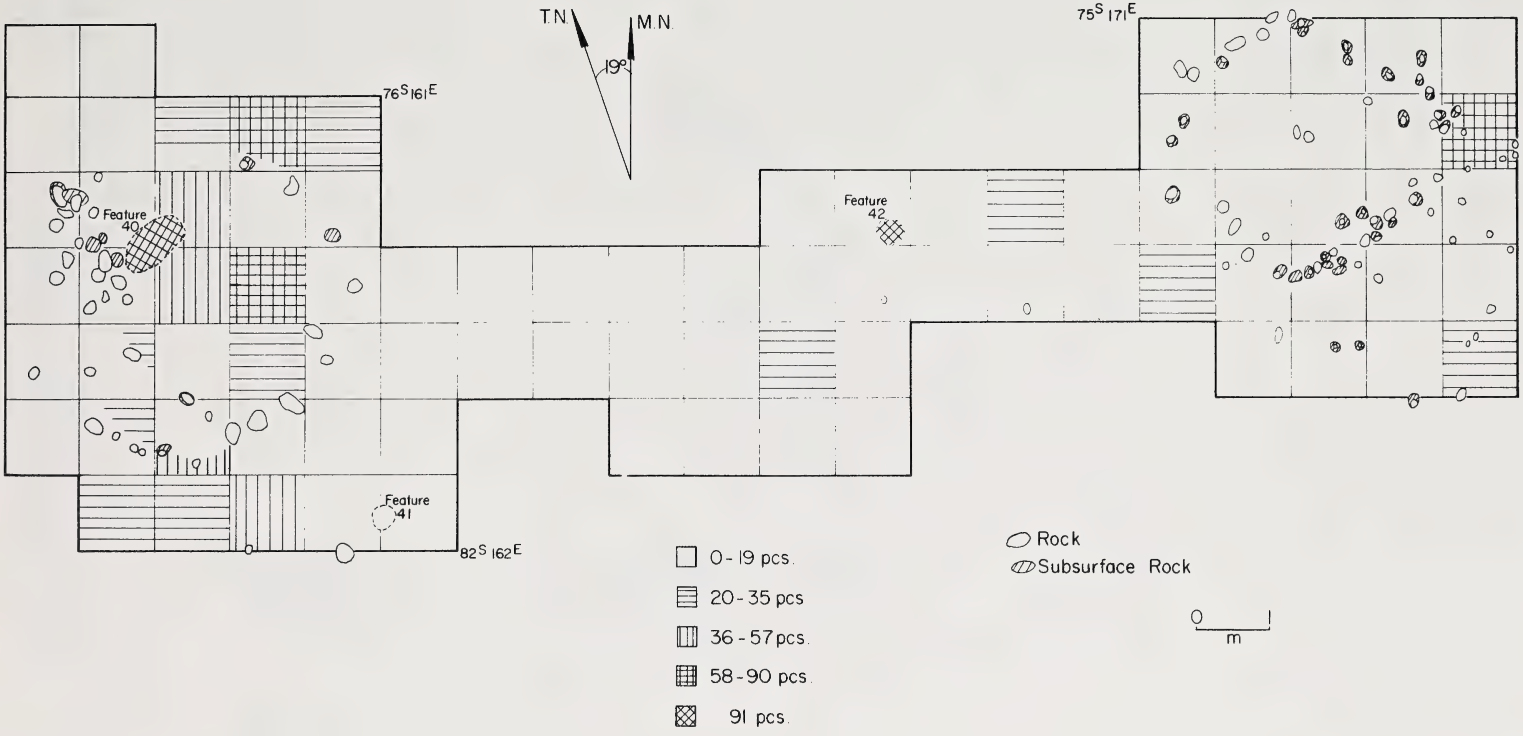


Figure 71: Density distribution by number of fire-broken rock, stone circles 16 and 17, DlOp 2.

Drawn by J Andreas.

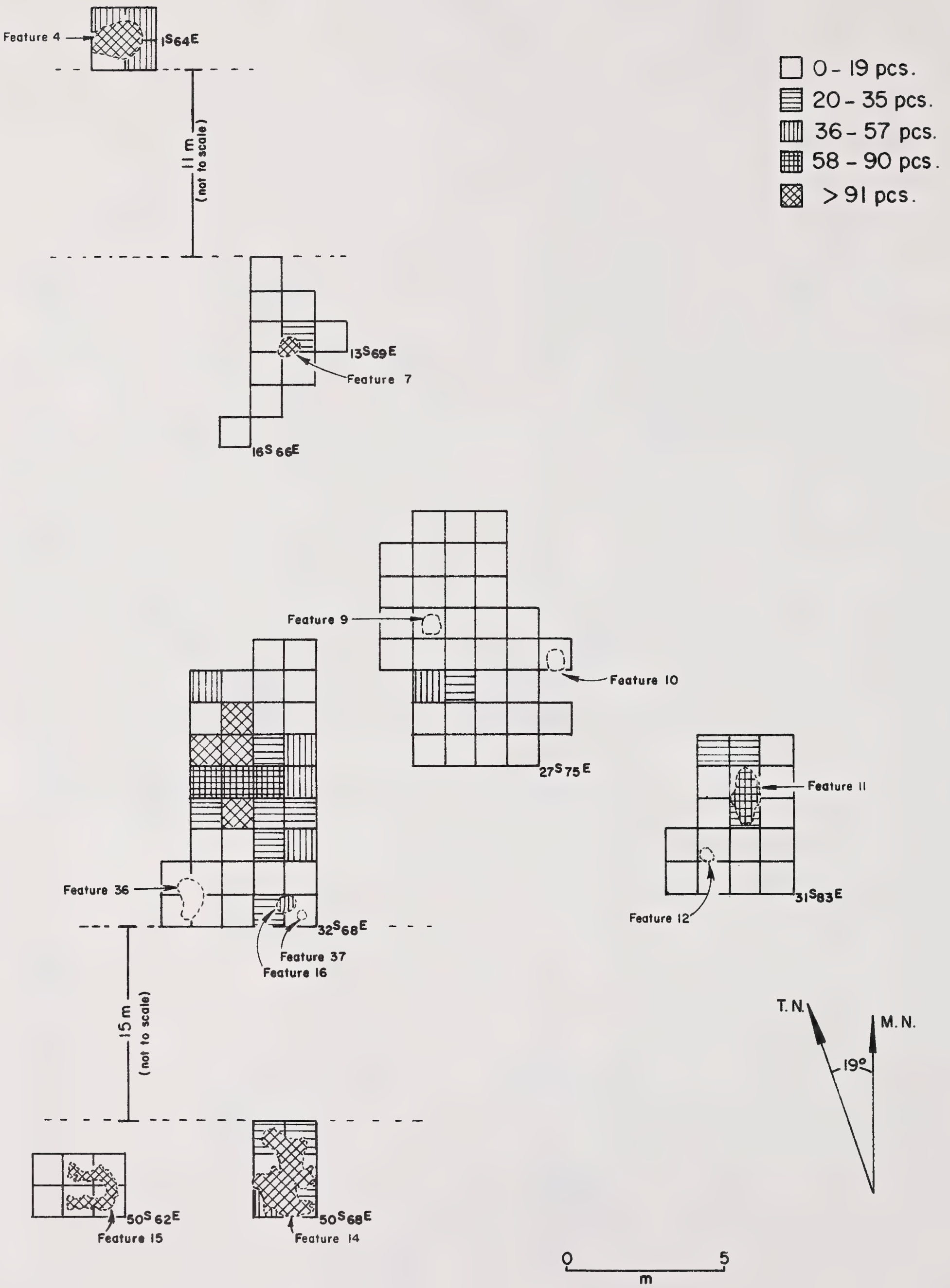


Figure 72: Density distribution by number of fire-broken rock, between stone circles, DlOp 2.

Drawn by J. Andreas.

Overall, the author interprets these distributions as being general social/cultural trends with minor individual differences. If these patterns are typical trends for the different aged stone circles, then there appears to have been relatively significant continuity through time. The ancillary features (FBR piles and refuse piles) show a strong correlation with the three Besant stone circles, and there are only minor differences in the one Bitterroot/Hanna ring.

8.4.5 Bone and Charcoal

Charcoal was virtually non-existent and faunal remains were very sparse. A total of 1,028 bone fragments ranged in size from 0-30 mm and weighed only 889.0 g. Table 46 provides a detailed distribution by individual feature. The majority of fragments were buried inside ancillary features resulting in preservation of these fragments. Most of the faunal remains, which were undoubtedly scattered across the site at the time of occupation, weathered away before they were sufficiently covered by the sediment that would have preserved them. Consequently, only a very small fraction of the bone that was once at Ross Glen was observed and recovered. The identifiable elements consisted mainly of tooth enamel fragments, a fragment of a second phalanx and a piece of vertebra. All faunal remains are believed to represent bison, but they could include other species. A few rodent bones (mandible, vertibrae and tibia) were also identified, but these may have been deposited long after the human occupation of the site.

8.4.6 Ceramics

Thirty-seven prehistoric ceramic fragments (Figure 73) were recovered from D1Op-2, Stone Circle 14. Most of the items (89 percent) were found inside the stone circle. Sherds were excavated from two general areas: in association with Feature 33 (35 percent) against the eastern margin of the stone circle and along the western and northwestern periphery of the circle (65 percent).

Ross Glen ceramics consist of relatively small body sherds, ranging in diameter from approximately 6.2 to 23.0 mm. No apparent lip, rim or neck sherds are represented in the sample. The majority of sherds (73 percent of the total sample) are fragmentary, showing angular fractures.

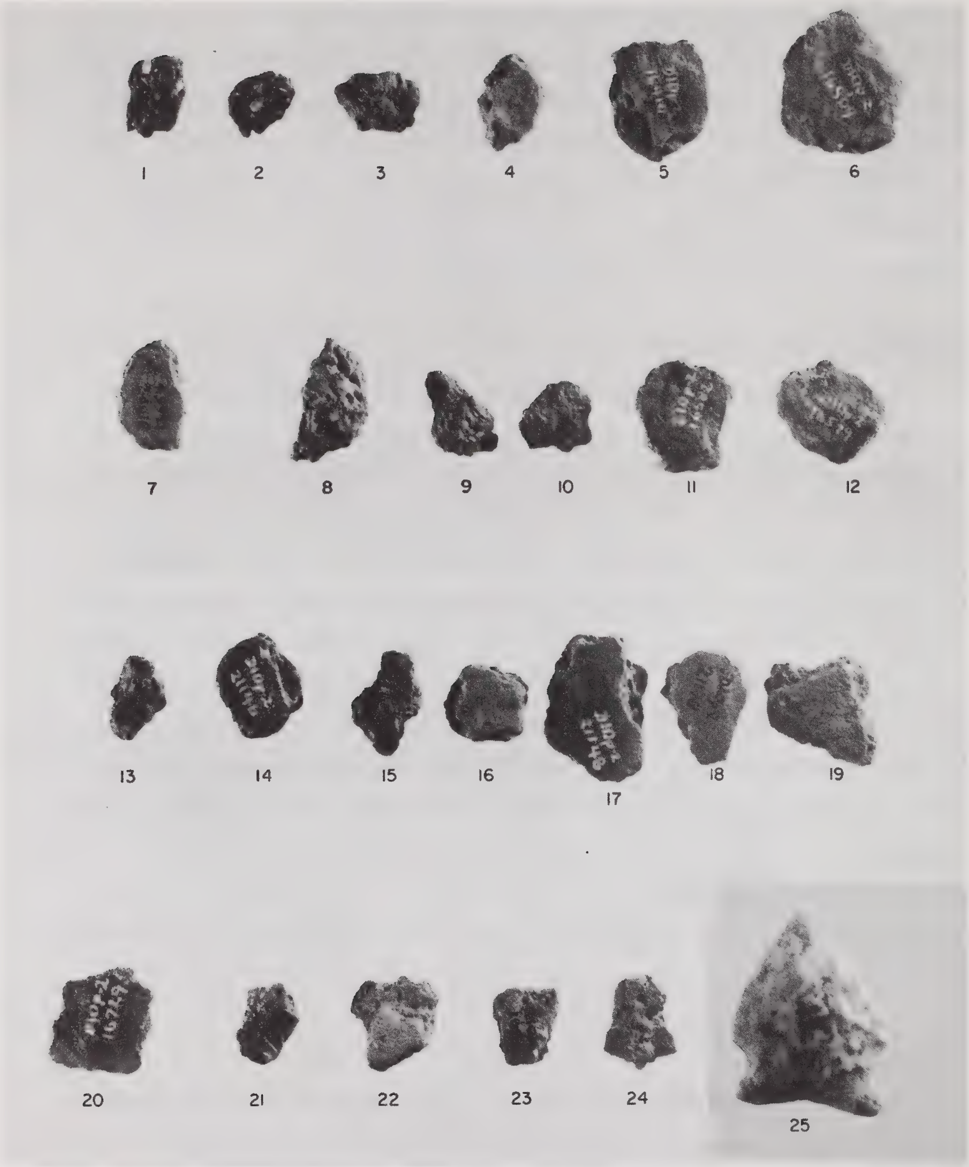


Figure 73: Ceramics 1 - 24 and associated Besant projectile point.

Several are split in half, but nearly all broken sherds show either interior or exterior surfaces. Edges of broken sherds appear weathered in most instances, indicating some degree of exposure subsequent to their original breakage. It is also worth noting that most excavation units which produced ceramics were situated in an area of the stone circle which had been stripped of sod. Accordingly, it is suggested that the remainder of the ceramic sample may have been removed during sod stripping operations.

Individual ceramic sherds appear to be well bonded. Hardness ranges between 3 and 4 on the Mohs' scale. A few sherds exhibit laminations. Temper consists of angular, unweathered fragments of quartz and feldspar. Individual temper particles range in size between 1.0 and 3.0 square millimetres, and temper is estimated to comprise 10-15 percent of the sherds by volume. Surface colour appears somewhat mottled. Exterior colour is light grey (10 YR 6/1, 6/2) and light brownish grey (10 YR 7/2). Interior colour is more variable, consisting of pale brown (10 YR 6/3), light grey (10 YR 7/2), light brownish grey (10 YR 6/2) and dark grey (10 YR 4/1). Encrustations are not present on any sherds within this sample. Internal structure, temper characteristics, and surface treatment indicate that only one ceramic vessel is represented.

Exterior surface characteristics consist of minor undulations and shallow striations. The undulations appear to resemble cord impressions which may have been smoothed prior to vessel firing. The striations may have occurred during the smoothing process. Due to the small sample size and the small size of the sherds, it is not possible to determine whether the undulations were formed as a result of fabric-impressing, cord-wrapping, or cord-wrapped-paddle application. Explicit decorations, such as punctates or grooved lines, are absent in this sample.

Interior sherd characteristics consist of smoothed surfaces and isolated occurrences of shallow striations. Again, it is postulated that the striations may have been made during interior surface smoothing activities. Interior surface decoration is lacking.

Comparison of the DlOp-2 ceramic sample with other published references is difficult, due to the small sample size. The sample was associated with the Besant occupation of Stone Circle 14, as shown by the recovery of a Besant projectile point and ceramics from Level 1 of

Excavation Square 41s101e. Several general comments concerning the ceramics can be presented at this time. The sherds from DlOp-2 resemble small, fragmentary sherds recovered from the surface of DjOn-8; Excavation Unit 5, DjOn-8; and Excavation Unit 9, DjOn-8 (Brumley et al. 1981:68-69, 240-242, 379-382, respectively). The Ross Glen ceramics do not appear to resemble pottery from the nearby Saamis site, EaOp-6 (Milne Brumley 1978); however, DlOp-2 ceramics somewhat resemble several Group 2 pottery fragments recovered from Subareas H and I (Dau and Brumley 1980:50-56) at EaOq-14 within the Medicine Hat Light Industrial Subdivision. From the broader, regional perspective, DlOp-2 ceramics can be grouped into the Saskatchewan Basin Complex Period I, as discussed by Byrne (1973:332-335). Period One ceramics date between A.D. 150-250 and A.D. 1150. Although accurate comparisons with photographs (as compared to actual in-hand samples) are difficult, it should be noted that DlOp-2 ceramics resemble select sherds from the base of the vessel illustrated in Plate 12 by Byrne (1973:714).

8.4.7 Discussion

Generally speaking, the Ross Glen site yielded a very high density (51 items per square metre) of cultural material from the 1981 excavation program. However, much of the fire-broken rock was discovered in concentrations which were designated as ancillary features. It is probable that a couple of the very dense excavation units containing fire-broken rock were also specific features but were not recognized as such during excavation.

The high frequency of fire-broken rock implies that considerable food preparation, by means of a stone boiling process, took place at the site. The location of fire-broken rock in specific features (40 percent of the total), both inside and outside the stone circles, indicates that various different functions or techniques were probably being employed at Ross Glen. It also points out that there was little disturbance to the site after the time of occupation. The pattern of discarding the fire-broken rock also reveals insights into the behavior of people utilizing this material.

The easily recognizable formed tools were very sparse (30 tools = 0.001 percent), although detailed examination of a sample of the lithic detritus did bring to light a number of other tools, such as cores and marginally retouched stone tools. The examination indicated that many of these tools were present in the lithic detritus. If the ratio is representative, a total of nearly 544 other tools (cores and MRST) may exist in the assemblage. This would increase the total percentage of tools to 0.02 percent, still only a minor part of the assemblage.

The general distribution of debitage and FBR was quite informative with respect to the cultural/social influences at Ross Glen. These data, coupled with other information, have revealed many insights into stone circles in general, and the Besant utilization of these features in particular.

The discovery, inside Ring 14, of at least one ceramic vessel directly associated with a Besant projectile point is the first clear indication that pottery was part of this material culture in Alberta. The fact that only one stone circle contained ceramics is cause for speculation. A number of questions can be raised. Does this ceramic occurrence mean that only a few people used this specific artifact, or were knowledgeable in its construction? Does the ceramic distribution show social status or wealth within the group? Would the vessel have been traded, or made and used by only one person? Although these questions cannot be satisfactorily answered at present, the fact that pottery was discovered in association with the Besant projectile point is very important, especially since many other Besant sites in Alberta have been investigated without the discovery of ceramics.

9.0 SITE AGE, CULTURAL AFFILIATION AND SEASONALITY

9.1 RADIOCARBON DATES

The Ross Glen site provided meagre samples of bone and charcoal; however, the age of this site was established through radiocarbon dating of two composite bone samples. A third sample of bone from Ancillary Feature 9 was submitted for radiocarbon analysis but was too small to produce a reliable date (Tueck personal communication). The initial sample from the 1978 assessment program was composed of 66 g of weathered bone fragments gathered from across the site, plus small (1 cm) burned and calcined bones from Ancillary Feature 3 (25 g).

The Geochron Laboratory provided two dates from this sample, one based on bone apatite and a second on bone gelatin. In the opinion of H. Grueger (personal communication 1979), an average of the two would provide the best age. The apatite date was 1485 ± 165 radiocarbon years B.P.:A.D. 465 (GX-5892-A); the gelatin date was 1330 ± 160 radiocarbon years B.P.:A.D. 520 (GX-5892-G). Both of these dates were corrected for C-13. The average of the above produces a date of A.D. 492 ± 156.

The second sample, gathered in 1981, consists of tiny burned and calcined bone fragments (544 g) recovered from Ancillary Feature 12 in 30s81e. Radiocarbon Limited Laboratory established a date of 4260 ± 140 radiocarbon years B.P.:3010 B.C. ± 160 (RL-1585). This date is MASCA corrected.

Although the latter date does not substantiate the earlier date, it does not necessarily imply that either is incorrect. These dates must be viewed in a broader context in order to assess their validity. Consequently, they will be discussed in the following section with reference to the recovered projectile points.

9.2 OCCUPATIONS AND CULTURAL AFFILIATIONS

The cultural manifestations at Ross Glen can be attributed to two Middle Prehistoric Period occupations and one occupation of undetermined affiliation. The earliest occupation, dated to 3010 B.C. and represented by an Oxbow, a Hanna, and a Bitterroot side-notched point, is believed to be a minor occurrence at Ross Glen. One stone circle (#13) and possibly three ancillary features (11, 12, 16) can be attributed to this early date. Two endscrapers (Figure 63:4 and 10) may also relate to this occupation, as does the debris (FBR and lithics) from the above features. This occupation was not evident from the 1978 excavations (Quigg 1979, 1980a, 1983).

The second, but primary, occupation dates to A.D. 500 and is represented by Stone Circles 1-15, 18 and 20 (with the exception of Ring 13) and the ancillary Features 1-39 (with the exceptions of 11, 12, 16). All the above features are attributable to the Bullshead Subphase

(Brumley 1981b) of the Besant culture (Wettlaufer 1955), which is part of the Napikwan cultural tradition which Reeves (1969, 1978b, 1983) dates from around A.D. 100 to approximately A.D. 700 for the Plains region. A total of eleven projectile points, classified as Besant, associated with fourteen endscrapers and seventeen bifaces are attributable to this phase. The criteria for this cultural association as derived from the projectile point styles are: frequency of ovate bifaces; types of endscrapers; absence of domed side scrapers and pointed unifacial flakes; rare occurrence of cobble choppers, chithos, and scraper planes; presence of surface hearths and FBR piles; and lack of rock-filled basins (Reeves 1983:92-100).

The third occupation is represented by two stone circles (16 and 17) and Ancillary Features 40-42 and is believed to be younger than the Besant occupation. However, no diagnostic artifacts were recovered during their excavation, and no dates are available to confirm this belief. The primary criteria for the younger age comes from the previous detailed stone circle analysis which showed that these two stone circles are significantly different (in size and depth) from the rest. The fact they are not as deeply buried implies they were constructed sometime after the Besant rings.

9.3 SEASONALITY

It was hoped that some type of direct evidence would be recovered to determine the season in which Ross Glen was occupied; however, since minimal faunal and floral material was uncovered, we are unable to define seasonality accurately. Ethnographic statements, such as "for a Blackfoot camp to have remained on the open plains in winter would have been suicidal" (Ewers 1955:124), support the idea that Ross Glen was not a winter camp. Ewers' informant goes on to relate that the movement into sheltered areas was generally in October or November, well in advance of the intense cold. Breakup of winter camp was around late March to early April. This implies that Ross Glen was probably not occupied during the period of November to March. Spring (May and June) was the season for hunting and collecting prairie turnips, bitterroot and camas. The assembling of bands for the tribal summer hunt (July to September) ended with the Sun Dance. This coincided with the ripening of serviceberries or dogfootberries. In the fall, the bands again separated for hunting, at which time quantities of meat were obtained and berries collected and dried. Stops of a week or longer in one locality were not uncommon (Ewers 1955:124-128).

Indirect evidence from Ross Glen then implies that at least the Besant occupation, and possibly the two others, best fit the fall period of a seasonal round (i.e., October). Material remains support the notion that considerable meat and hide processing activities took place at Ross Glen. Also, the general site area would have been suitable for bison hunting at that time of year.

10.0 RESULTS IN RELATION TO OBJECTIVES

The objectives for the 1981 excavation were an outgrowth of the 1978 site assessment program (Quigg 1980). Six major objectives were stated in general terms in Section 6.0 and are detailed below.

Objective #1

Objective #1 was to investigate the contemporaneity and age of the three proposed groups of circular stone features - specifically, Rings 10 and 11 in proposed Group A; Rings 13 and 14 in proposed Group B; and Rings 16 and 17 in proposed Group C. The excavations of Stone Circles 10, 11, 13 and 14 yielded diagnostic projectile points, while Rings 16 and 17 provided no new evidence as to their age. The projectile points discovered with Stone Circles 10, 11 and 14 are classified as Besant. Other cultural material discovered, plus the distribution of ancillary features, supports the contemporaneity of these three features and their association with previously excavated Besant stone circles (5 and 12). Therefore, the earlier assumption that Groups A and B are contemporaneous and associated with a Besant occupation is generally supported by the results of the 1981 excavation. The distribution of material remains, as well as the types, frequency and location of ancillary features discovered in Stone Circles 16 and 17, add strength to the earlier interpretation that Group C stone circles are not associated with the main Besant occupation.

Discovery of the Bitterroot and Hanna projectile points inside Ring 13 shows that at least one ring is not associated with the others. The location of the ancillary features adds support to this view, although both similarities and differences among ancillary features were noted. In general terms, excavation in the three different groups support the initial interpretations based on the analyses of the stone circle data, with the exception of Stone Circle 13.

Objective #2

Objective #2 is concerned with the types and associations of the ancillary features. Although the excavation added important information to our general understanding of these features, it did not, in every instance, allow interpretations of specific functions. Refuse piles, boiling pits, FBR waste piles and lithic concentrations were discovered, and specific associations were observed. One association concerns the location of refuse piles within the eastern side of the Besant stone circles. Another consisted of hearths immediately adjacent to fire-broken rock piles and/or refuse piles. A third is the occurrence of the small post molds (the remains of tie-down stakes) in the center of a number of the stone circles. A fourth consists of the association of at least one ancillary feature (#12) with another occupation besides Besant. These important discoveries reveal aspects of the cultural and social processes in operation at Ross Glen. Consequently, this objective was met successfully.

Objective #3

The third objective was to obtain direct seasonal occupational data for the site. However, this was precluded by the lack of preserved faunal remains and the fragmentary nature of what was discovered. In addition, no other evidence, such as seeds or grinding implements, was recovered. This is unfortunate, since establishing the seasonal round and utilization of Ross Glen could potentially contribute much to our general understanding of prehistoric lifestyles. The season of occupation is still interpreted as early fall, based on indirect lines of evidence (i.e., extensive food processing, preparation of skins, site location, patterning of stones in the circular rings, etc.).

Objective #4

Objective #4 was to acquire data on cultural material as it relates to social patterns. Distributional data made significant contributions toward this objective. The results were much greater than anticipated, with many cultural patterns coming to light which can be linked to social, individual, cultural and/or environmental influences. A number of the patterns observed are:

1. The distribution of fire-broken rock inside the Besant stone circles shows a clear pattern of cleaning the interiors of the structures, a task which was uniformly undertaken by the entire group.
2. The use of tie-down stakes by occupants of the structures implies that they were well aware of the windy conditions and that some occupants chose to prepare for them.
3. The tie-down stake in the Bitterroot ring also implies that this technique had been in use for a long time.
4. The location of the boiling pits, hide smoking features, etc. away from the immediate margins and interiors of the structures shows selection and preferences by the occupants.
5. The overall distribution of the stone circles in small clusters within larger groups implies structural organization rather than random placement patterning.
6. The discovery of ceramic material in only one of five Besant-related structures indicates that some type of selection processes in operation by the inhabitants.
7. The variations observed in the patterning of the stones within the five Besant structures reflects individual preferences that are overlain by cultural patterns.

The above-stated patterns, in addition to others observed at Ross Glen, are very significant in understanding the lifeways of the people of the past. Objective #4 was achieved with tremendous success.

Objective #5

The data recovered from the excavations permit comparison of tool assemblages among the three groups (A, B, C) of stone circles (Table 47). The two rings (16 and 17) in Group C revealed no formed tools and, accordingly, they differ from assemblages recovered from the other two ring groups (A and B). However, the presence of lithic debitage and fire-broken rock links all three groups. An interesting difference appears in the two Besant stone circles from Group A when compared to the one in Groups B; the latter contained pottery and the former did not. The quantity and ratio of fire-broken rock from Group B (Stone Circle 14) also differ considerably from Group A (Rings 10 and 11). However, the formed tools (points, bifaces and endscrapers) are all very similar between the two Besant ring groups. Slight differences in the tools, their distribution, etc., are believed to be a consequence of individal variations rather than cultural differences.

Objective #6

The general differences observed and recorded (e.g., size, shape of ring, number of stones, weight of rings) in the stone circles of Groups A, B and C, and between stone circles within groups, are interpreted as individual variations. As shown previously, the depths and sizes of Stone Circles 16 and 17 indicate that they do not represent the same occupation as the others. The 1981 excavations yielded neither artifacts nor distributional patterns which would alter the original interpretation, although direct evidence is lacking.

An interesting link between Ring 14 in Group B and Ring 10 in Group A was the clustering of stones in the ring itself. This showed a unique patterning, even though Ring 14 was only approximately one-half present. Both stone circles in Group B were represented only by partial arcs of stone, but it was believed this occurrence was influenced by various disturbances and not by differences in construction. This being the case, it is impossible to compare them directly with stone circles in Groups A and C. Comparing Rings 10 and 11 from Group A shows differences even though both were affiliated with Besant. Ring 10 demonstrated a clustering of stones throughout the entire ring, while Ring 11 had fewer stones and no observed clusters.

11.0 ROSS GLEN SUMMARY AND INTERPRETATIONS

11.1 GENERAL SUMMARY

The 1978 assessment (246 square metres), coupled with the 1981 excavation (508 square metres) at Ross Glen, provide approximately a two percent sample from which to reconstruct the prehistoric lifeways that existed at this unique and significant site. Eighteen circular stone features and 42 ancillary features have thus far been recorded at D1Op-2, which is estimated to cover an area of 37,800 square metres. In total, the site yielded 45,033 pieces of cultural material (lithic debitage, fire-broken rock and bone) from the 754 square metres of excavation. This provided a density of 59 items per square metre. Lithic debitage (n=25,459) accounted for 56 percent of the total cultural remains, while the fire-broken rock (n=19,494) accounted for the remaining 43 percent. The faunal remains were quite sparse (1,036 g), as were the easily recognizable formed tools (n=56) which included 18 projectile points, 23 bifaces and 15 endscrapers. The latter tools represent only 0.0013 percent of the total cultural material recovered.

Investigations consisted of mapping each stone circle feature (n=18), recording the weight and depth of each observed stone in those features, and mapping the features in relationship to each other (producing a single site map). In total, 452.1 square metres were excavated outside the stone circles, and another 301.9 square metres were excavated inside these stone circles. The latter consisted of the complete excavation of eight stone circles (5, 10, 11, 12, 13, 14, 16 and 17) and partial excavation of two stone circles (2 and 7). Fifteen of the 42 ancillary features were recorded inside the stone circles, while the remaining 27 were found outside the rings. Of those ancillary features, 40 were excavated.

There were numerous significant discoveries from the Ross Glen site; these will be discussed below. Three are noteworthy here:

1. The frequency of ancillary features is one of the highest known for any stone circle site in Alberta and possibly in the entire Northern Plains region.
2. The site contains the highest density of cultural material of any

stone circle site thus far reported in Alberta and, again, possibly in all the Northern Plains.

3. For the first time in Alberta, ceramics have been found directly associated with Besant materials in good cultural context.

11.2 SPECIFIC SUMMARY

The total body of evidence - archaeological data, material association and distribution, depth, size, and distribution of the eighteen stone features, plus comparison of these to the ethnological data - indicates that the stones in the circular patterns were used primarily as weights to hold down the edges of tipis (habitation structures) as Kehoe clearly documented in 1960. These rings of stone then mark the areas where structures were placed, and their size and shape are representative of this type of structure. Assuming the stones were placed on the surface to hold down the edges of tipis, the major variations observed in the average depth of burial of individual rings indicate different episodes of occupation. This being the case, the two major divisions detected in the analysis of the burial depths of the eighteen rings implies there were at least two occupations at Ross Glen.

The major occupation is believed to be represented by Stone Circles 1-15, 18 and 20 in association with Besant projectile points, all from the surface and from the initial 1978 assessment excavations. The second inferred occupation (Stone Circles 16 and 17) is believed to be later than Besant but of unknown cultural affiliation.

The recovery of Besant points from three more stone circles (10, 11 and 14) during the 1981 excavations substantiated that the major occupation at Ross Glen is affiliated with Besant. No diagnostic artifacts were recovered from Stone Circles 16 and 17 to support the separate occupation of these two features. However, a third occupation came to light through the discovery of additional projectile point styles (Bitterroot, Hanna, and Oxbow). The former two points were recovered inside Stone Circle 13. The evidence for this third occupation is strengthened by the presence of an Oxbow point located near Ancillary Feature 16 and by a radiocarbon date of 3,010 B.C. from Hearth 12.

The Besant occupation accounts for the majority of occupational debris and features. Six stone circles (5, 7, 10, 11, 12 and 14) yielded Besant points; three other Besant points came from the stripped portion of the site. Not only did the projectile points link these stone circles, but many observed patterns support their association. In the five completely excavated Besant stone circles (5, 10, 11, 12 and 14), the lithic density was twice as high inside as outside. Fire broken rock was concentrated inside the eastern margins of all five stone circles. Interior post molds were discovered in four rings (5, 10, 11 and 14). These post molds were generally just east of the center point and are believed to represent the location of tie-down stakes as mentioned in the ethnographic record. The stakes would have had a cord attached to them from the top of the tipi poles to secure the structure during strong winds. Recognizable ancillary features (refuse piles) were located on the east side at four rings (10, 11, 12 and 14), and concentrations of material remains were also found near the centers in all but Ring 14. The latter ring was the only one to show a higher density of FBR outside the stone circle.

One intriguing link between Besant Stone Circles 10 and 14 is that both have definable clusters of stones (Figure 37) comprising the ring. These clusters are believed to have been placed around the tipi poles during times when the skin edges were rolled up to allow air to pass through the structure. Grinnell (1962:67) notes "... as midday approached and the sun grew hotter many of the people retired to the lodges; the lodge-skins were raised all about and they sat there in the shade, while a warm breeze blew through the lodge." If these clusters were around the tipi poles, then there were an extimated nineteen poles in Stone Circle 10 and ten poles in the surviving half of Stone Circle 14. Raising of the lodge covers may account for the fact that interior refuse piles overlap the stone circle edges.

Other variations observed in the excavated Besant stone circles are as follows (see Table 48 for specific details): a) the size of the ring features varied from 5.9 to 8.03 m; b) the average weight of the stones utilized ranged from 4.1 to 7.0 kg; c) the total weight of stones used in the ring construction ranged from 272.1 to 751.1 kg; d) the mean depth of the rings ranged from 11.3 to 15.3 cm below surface; and e) the number of stones employed in the construction varied from 47 to 114.

These figures reveal numerous variations that are difficult to express in a single statement. The author believes that there are economic and social differences reflected in the various sizes of the rings. Individual differences are seen, to some extent, in the number and positioning of the stones in the rings. The discovery of one ceramic vessel in one stone circle probably reflects individual preference and, possibly, social status. The distribution of cultural material inside the structures seems to represent a general cultural pattern and also reflects the orientation of the doorway.

It is believed that the quantity and types of ancillary features and cultural debris reflect not the social or cultural patterns but rather the length and season of occupation. The clustering of stones observed in two rings implies environmental conditions in addition to personal requirements for fresh air. Thus, the Ross Glen site reflects significant social, cultural and individual preferences of the occupants.

The Besant people took advantage of the natural resources at this locality, specifically: a) the availability of surface stone for holding down their structures and for the production of stone implements; b) the soft sand for the excavation of certain ancillary features; c) the food resources to supply significant quantities of meat for consumption then and later; and d) the availability of wood and water from the adjacent creeks.

The patterned arrangement of the Besant tipi rings implies that two groups or bands occupied the site simultaneously and that the arrangement of tents within these groups was based on relationships among individuals and/or families within each group. The sizes of the rings reflected a combination of social status and wealth within the group. It is probable that joint utilization of the site was a prerequisite for conducting a successful sizable killing operation in order to acquire the necessary meat for the winter camp.

The third and newly discovered occupation at Ross Glen was represented by the one stone circle (13), the early dated ancillary feature (12), and possibly two other ancillary features (11 and 16) based on their association. Features 12 and 16 were the closest to Ring 13, and the Oxbow point was near 16. Only half of Stone Circle 13 was present, possibly because stones were taken from it to construct a Besant ring. It showed similarities to the Besant rings - specifically in the depth of burial of the stones, the weight of stones and the size of the structure represented. However, the location and type (FBR piles) of ancillary features were different. The central hearth and post mold were both present, but the former was quite different from the central hearths in the Besant rings. Again, we see some social, individual and/or cultural differences, but continuity is implied by the use of the stone circle and other items (e.g., lithics, fire-broken rocks and hearths) through a long time span.

Stone Circle 13 is interpreted as having been utilized during the fall season. The occupants conducted food procurement and processing and possibly stone tool manufacturing, while camping at this locality for a week or two.

The occupation represented by Stone Circles 16 and 17 and Ancillary Features 40 and 42 again showed the same types of similarities and differences as discussed above. The quantity of cultural material and the number of stone circles lead the author to suggest these were occupied during the spring or summer season, when short-term camping was a general rule.

12.0 COMPARISONS

Briefly, I would like to point out some of the more interesting comparisons of the Besant occupation to other Besant sites in Alberta. The radiocarbon date of A.D. 500 definitely falls within the documented time range for Besant in Alberta. Existing dates place this phase in a period ranging from 330 B.C. ± 45 years (Quigg 1980) at EaPk-109 in southwestern Alberta to A.D. 680 ± 150 (Gruhn 1971) at the Muhlbach site in central Alberta. A number of kill sites, such as Head-Smashed-In (Reeves 1978a:151-174) and Old Women's (Forbis 1962:57-123), provide dates and projectile points, but their use for comparison with a campsite assemblage is generally unsuitable.

Many Besant campsites in southern Alberta are known, but only a few have undergone excavation and reporting. Other surface ring camps

(EfOo-32) have been tested (Reeves 1977), while buried ring camps EhPp-1 (McIntyre 1978) and EaPk-109 (Getty 1969) and possibly the Kenney site, DjPk-1 (Reeves 1966) have produced extensive Besant materials. Ring sizes ranged from 3 to 10 m at EfOo-32, while the buried rings at EhPp-1 averaged 5.1 m in diameter. Thus, there appears to be a substantial size range for Besant structures.

Ancillary features are also recorded from other sites. These include one surface burn from the limited excavations at EfOo-32; nine features including FBR piles, hearths and stains from EhPp-1; and numerous FBR piles and surface burns at the Kenney site and EaPk-109.

Artifact frequencies and variety of artifacts have been characteristically low, as was the case at Ross Glen. The Kenney site, which had two Besant components, produced the greatest frequency of tools. The lithic varieties observed at the various Besant sites show an extensive utilization of local resources, with a couple of notable exceptions (the Kenney site and Muhlbach). Most seem to contain minimal amounts of imported lithics (i.e., Avon or Montana Cherts). Spatial distributions of lithics at EhPp-1 revealed specific activity areas associated with the buried Besant rings. These were predominately located inside the rings, while cultural material outside the rings was generally associated with ancillary features.

Although bone was sparse at Ross Glen and EfOo-32 (both of which are surface ring camps), the three buried sites mentioned above yielded quantities of butchered bison bone. I believe there is definite evidence for there having been quantities of bone present at Ross Glen at one time. Evidence for processing of meat and hides is demonstrated by the cultural assemblage at nearly all the sites. The Besant sites thus far seem quite similar. Minor differences may be partially accounted for by seasonal variations, preservation and sampling frequencies. Foetal bones were recovered from all three buried sites, indicating a late winter/spring habitation on terraces of small creek valleys in and along the foothills. Both surface sites (Ross Glen and EfOo-32) are in southeastern Alberta on exposed prairie locations. Based on the findings at Ross Glen, these camps probably represent the fall period in a seasonal round of encampments.

It may be too soon to see the differences one might expect from seasonal occupations, and we can only await more detailed site reports to support or reject the present findings. Further excavation and comparison of sites in different localities is necessary to evaluate the interpretations suggested in parts of this report.

13.0 RECOMMENDATIONS

The quantity and quality of archaeological and anthropological data discovered at Ross Glen has demonstrated beyond question the value that at least some stone circle sites contain. Consequently, cultural resource managers and investigators should not disregard stone circle sites. Detailed recording (mapping, weighing and measuring the depth of the stones) of the stone circles should be conducted, along with sufficient subsurface investigation (both inside and outside the stone circles), to document the presence or absence of cultural material and the types and frequency of these materials.

The excavation technique of general shovel-shaving in 10 cm arbitrary levels within one square metre can provide a suitable compromise between mere artifact recovery and the slower method of recording material in situ. Large block excavations are certainly required to show distributional patterns within and between stone circles. The ancillary features minimally require fine-screening (1 mm mesh), and soil samples should be taken as well. If the soil contains sufficient clay, then samples for archaeomagnetism should also be collected to support or replace radiocarbon dating. The contents of these small but significant activity areas should never be overlooked or neglected without excavation. The presence of ancillary features is certainly important, but the contents are even more important.

The minimal analysis done on the fire-broken rock (sizing, counting and weighing-in categories) has been shown to be significant in determining different functions for specific piles of this material. Methods of use and functional differences may come to light by examining the sizes and types present within a specific site. The author recommends continued use and analysis of this type of cultural material.

If it proves to be impossible to preserve the Ross Glen site, then close monitoring of the topsoil stripping is strongly recommended. Sufficient time should be allotted following the stripping to record and excavate ancillary features (i.e., hearths, FBR piles, etc.) which may come to light. Given the significance of the site and the smaller size of the acquired sample, the author expects numerous other ancillary features to be found during and after topsoil stripping. The precise location of these is very important for establishing internal site patterns and interpretations of social organization. The form, type and contents of these ancillary features could reveal specific activities undertaken at Ross Glen, and possibly provide seasonal information.

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APPENDIX I: Tables

Table 1: Summary of location and size of fire-broken rock, D10p-2.

Size of Fire Broken Rock	Small (0-4 cm)		Medium (5-9 cm)		Large (< 10 cm)		
Provenience	#	Wt (kg)	#	Wt (kg)	#	Wt (kg)	Total #
Ring 2 - Inside	14	0.5	16	2.7	5	7.5	35
Ring 5 - Inside	1151	14.3	204	31.8	52	39.2	1407
Ring 5 - Outside	882	13.3	169	20.5	29	30.1	1080
Ring 7 - Inside	585	4.9	50	9.1	9	3.9	644
Ring 7 - Outside	121	2.7	41	5.5	7	3.6	169
Ring 12 - Inside	313	4.4	113	13.0	21	16.7	447
Ring 12 - Outside	281	3.6	63	9.1	9	7.9	353
11N13W - Outside	4	0.1	3	0.5	1	0.4	8
26S16E - Outside	27	0.2	6	0.7	0	0.0	33
Ancillary Feature 3 - Outside	94	0.5	3	0.1	0	0.0	97
Ancillary Feature 1	1479	17.4	406	46.8	34	15.7	1919
Total - Inside	2063	24.1	383	56.6	87	67.3	2533
Total - Outside	1409	20.4	285	36.4	46	42.0	1740
TOTALS	4951	61.9	1074	139.8	167	125.0	6192

Table 2: Cultural material distribution from 1978.

Area Assessed Inside and Outside the Stone Circles

	Inside	Outside
Ring 2	16.0	0.0
Ring 5	35.6	90.4
Ring 7	8.0	8.0
Ring 12	40.8	27.2
Other	0.0	16.0
	100.4 sq. m	145.6 sq. m = 246 sq. m

Cultural Material per Square Metre for Inside and Outside

Inside	Material	Outside
52.5	Lithics	35.5
25.2	FBR	11.9
0.2	Tools	0.1
0.3	Bone	0.7
78.7/sq. m	Totals	51.5/sq. m

Table 3: Lithic types and distribution at Ross Glen from 1978.

			CHALCEDONY						CHERTS					
UNIT	QUARTZITE	ARGILLITE	KNIFE R. FLINT	PET WOOD	OTHER	WHITE	BLACK	BROWN	AVON*	OTHER	GNEISS	OBSIDIAN	OTHER	TOTAL
Surface	3	3	5	0	0	3	0	2	1	0	0	4	0	21
Ring 2 Inside	153	8	0	1	0	4	0	1	1	0	2	0	1 Mudstone	171
Ring 5 Inside	2331	109	3	59	0	13	5	4	3	24	11	0	14	2576
Ring 5 Outside	2789	150	2	21	1	6	3	3	3	17	11	0	6	3012
Ring 7 Inside	1443	284	6	8	11	315	3	1	1	24	0	0	5	2081
Ring 7 Outside	331	26	1	3	0	5	0	0	1	0	0	0	3	370
Ring 12 Inside	1117	328	3	6	2	7	0	1	1	2	9	0	4	1480
Ring 12 Outside	622	73	1	5	0	6	0	1	0	3	12	0	3	726
Ring 12 Feature 1	1142	505	0	4	3	5	1	9	1	4	5	0	3	1681
11N-13W Outside	146	6	0	0	0	0	0	0	0	0	0	0	0	152
16S-16E	171	8	0	2	0	2	2	2	0	1	0	0	1	189
Feature 3 Outside	37	78	0	0	3	1	0	0	1	0	0	0	3	123
Site Total Inside	5042	729	12	74	13	339	8	7	6	30	22	0	24	6308
Site Total Outside	4099	334	9	31	4	23	5	8	6	21	23	4	16	4593
Feature 1	1142	505	0	3	3	5	1	4	1	4	5	0	3	1681
Site Total	10285	1578	21	108	20	367	14	24	13	55	50	4	43	12582

*Dull white in colour

Table 4: Manufacturing stages in sample of lithic debitage, D10p-2.

Units	Decortication Flakes		Secondary Flakes		Block Fractures	Resharpening or Retouching Flakes	Cores	Totals
	Primary	Secondary	Complete	Broken				
14N-0W (NW)								
Inside Ring 7	9	102	84	99	124	104	1,2,1	526
14S-45E (SE)								
Inside Ring 12	7	30	42	92	85	59	1,0,1	317
14S-46E (NE)								
Inside Ring 12	5	35	24	30	52	30	2,0,0	178
Total Inside Ring	21	167	150	221	261	193	4,2,2	1021
Percentage	2.06	6.36	14.69	21.56	25.56	18.9	.39,.2,.2	
14S-50E (SE)								
Feature 1								
Outside	14	58	55	103	84	213	2,1,1	531
10S-4E (K)								
Outside Ring 5	0	17	30	34	36	42	1,0,2	162
10S-4E (K)								
Small Depression								
Outside Ring 5	0	26	39	24	50	23	0,0,0	165
10S-4E (L)								
Outside Ring 5	0	13	16	8	14	6	0,1,3	61
10S-4E (L)								
Outside Ring 5	5	19	14	18	28	23	1,0,2	110
Total Outside Ring	19	133	154	187	212	307	4,2,11	1029
Percentage	1.85	12.93	14.96	18.17	20.6	29.83	.39,.2,.63	
Totals	40	300	304	408	473	500	8,4,13	2050
Percentages	1.95	14.63	14.83	19.9	23.07	24.39	.39,.2,.63	

Table 5: Metric and non-metric characteristics of projectile points from the 1978 assessment.

NUM	ASSOC		PIT		DEPTH		MAT	BL	SL	TL	MXBW	SHW	MXSW	MNSW	BSW		WLN	WRN
	DLN	DRN	HLBE	HRBE	MXBT	MXST	WT	DPF	DSF		VPF	VSF	X-SEC		DLBE	DN	DBE	DB
674	R#7-IN		14N OE		0-10	(1)	3A	IND	9.0	IND	25.6	25.6	20.0	16.0	20.0		6.3	9.2
	3.2	2.6	NA	NA	6.1	4.5	5.5	WL,OV	AB		OV,WL	AB	BCV		AB	PR	PR	AB
4866	R#12-IN		14S 46E		0-10	(1)	11A	IND	IND	IND	24.0	IND	IND	IND	IND		IND	IND
	IND	IND	IND	IND	5.7	IND	6.5	OV,WL	AB		OV,WL	AB	BCV		AB	IND	IND	IND
2625	SURFACE -		BLADED		AREA		5A	IND	10.0	IND	IND	IND	IND	16.9	IND		7.8	IND
	1.4	IND	2.1	IND	7.4	5.8	5.2	OV,WL	AB		EX,IR	AB	BCV		PR	PR	PR	AB
2626	SURFACE -		BLADED		AREA		5A	IND	9.8	IND	22.6	22.4	20.4	17.6	19.8		7.8	6.2
	1.8	1.9	1.7	1.7	5.7	4.8	4.7	OV,WL	AB		OV,WL	AB	BPL		AB	PR	PR	PR
2635	SURFACE						5A	IND	IND	IND	IND	IND	IND	IND	IND		IND	IND
	IND	IND	IND	IND	IND	IND	1.2	OV,WL	AB		OV,WL	AB	BCV		IND	IND	IND	IND

See Appendix II for explanation of abbreviations.

Table 6: Metric and non-metric characteristics of bifaces from the 1978 assessment.

NUM	ASSOC	ANGLE	PIT	MXBT	MXST	QUAD	WT	DEPTH	DPF	DSF	TYPE	BL	VPF	VSF	SL	TL	X-SEC	DLBE	MXBW	DB	SHW	MAT	MXSW	MNSW	BSW
2930	F#1	A	14S 50E	7.8	7.9	NE	20.1	0-10 (1)	EX,WL	AB	1	48.6	EX,IR	AB	20.5	69.1	PLCV	PR	31.8	PR	31.0	3A	IND	25.9	IND
4402	F#1-IN	A	14S 50E	13.6	7.6	SE	61.9	0-10 (1)	OV,WL	MR,IR	1	82.7	OV,WL	AB	13.3	96.0	PLCV	PR	50.4	AB	45.0	2A	34.3	33.8	23.8
673	R#7-IN	M	14N 0E	16.5	NA	NW	56.1	0-10 (1)	MR,14	AB	1	NA	OV,WL	AB	NA	67.9	BCV	AB	47.6	NA	NA	3B	NA	NA	NA
4872	R#5-IN	M,A	10S 8E	15.3	NA		102.4		OV,IR	MR,WL	1	107.6	OV,WL	MR,IR	NA	107.6	PLCV	PR	49.4	NA	NA	2A	NA	NA	NA
3573	F#1-IN	M	14S 50E	7.5	NA	SE	6.5	0-10 (1)	EX,WL	AB	1	38.6	OV,WL	AB	NA	38.6	BCV	AB	24.9	PR	NA	5B	NA	NA	19.2
4870	NA	A	NEAR F#17	18.0	NA		115.9	SURFACE	OV,2L	AB	2	NA	EX,WL	AB	NA	95.5	PLCV	PR	62.1	NA	NA	2A	NA	NA	NA
2634	NA	M	NA	16.8	NA		101.9	SURFACE	MR,WL	AB	2	NA	OV,WL	AB	NA	98.4	BCV	AB	54.9	NA	NA	2A	NA	NA	NA
4408	F#1-IN	M,A	14S 50E	14.0	NA	SE	31.1	0-10	MR,IR	AB	2	NA	OV,WL	AB	NA	51.4	PLCV	AB	37.5	NA	NA	3A	NA	NA	NA
8510	NORTH END OF SITE	M,A		10.3	NA		20.1	SURFACE	OV,IR	MR,IR	2	NA	OV,WL	MR,WL	NA	48.5	BPL	PR	46.7	NA	NA	3A	NA	NA	NA
4098	R#12-OUT	A	10S 50E	10.3	NA	SW	14.6	0-10 (1)	EX,IR	AB	2	NA	EX,IR	AB	NA	50.6	BCV	AB	27.6	NA	NA	3A	NA	NA	NA
2560	R#7-OUT	A	14N 0E	10.9	NA	SE	15.3	0-10 (1)	OV,IR	AB	2	NA	MR,WL	AB	NA	43.1	BTR	AB	42.8	NA	NA	2A	NA	NA	NA
1093	NA	M	10S 16E	19.8	NA	NE	54.8	0-10 (1)	EX,WL	AB	2	NA	EX,IR	AB	NA	63.0	CVTR	PR	47.4	NA	NA	2A	NA	NA	NA
8509	NA	M	NEAR F#17	9.4	NA		12.8	SURFACE	OV,IR	AB	2	NA	OV,WL	MR,IR	NA	40.2	PLCV	PR	36.4	NA	NA	5A	NA	NA	NA

See Appendix II for explanation of abbreviations.

Table 7: Metric and non-metric characteristics of endscrapers from the 1978 assessment.

NUM	ASSOC		PIT		QUAD	DEPTH	STAT	AXA	AXB	AXC		AXD	WT	PRE	RED	EXT	SHAPE
	MAT	WEL	WEC	WEA	LLET	LLEC	LLEA	RLET	RLEC		RLEA	PET	PEC	PEA	OTHER		
4867	R#12-OUT		14S 46E		SW	0-10 (1)	CM	24.2	15.5	7.3		6.0	3.12	FL	TR	EX	OV
	5M	18.3	WL	M	UN	USE	A	AB	NA		NA	AB	NA	NA	DDE		
3967	NA		14S 42E		NW	0-10 (1)	FR	17.4	16.8	3.8		3.8	1.33	SH	TR	OV	TR
	5M	16.0	WL	M	IND	IND	IND	UN	WL		S	IND	IND	IND	DDE		
1495	NA		10S 16E		SE	0-10 (1)	CM	18.7	16.1	4.0		4.0	1.28	FL	TR	OV	TR
	5M	13.9	WL	M	UN	USE	M	UN	WL		M	AB	NA	NA	SP,DDE		
2633	NA					SURFACE	CM	21.2	17.6	6.4		6.1	2.72	FL	TR	OV	TR
	5M	16.8	WL	S	UN	WL	M	UN/BF	WL		M	AB	NA	NA	SP,DDE		
1344	R#5-OUT		10S 16E		SW	0-10 (1)	CM	20.0	17.5	5.9		5.0	2.09	FL	TR	OV	TR
	5M	17.0	WL	M	UN	WL,USE	A	UN	USE,WL		M,A	UN	WL	P	DDE		
1045	R#7-IN		14N 0E		NW	0-10 (1)	FR	10.0	16.8	7.4		6.7	1.70	SH	TR	OV	PL
	5M	16.4	WL	M	UN	IR,USE	A	UN	USE,WL		M	IND	IND	IND	SP,DDE		
4441	R#12-OUT		14S 50E		SE	0-10 (1)	FR	17.4	21.4	6.6		5.7	3.58	SH	TR	MR	PL
	5A	19.1	WL	S	UN	WL,USE	M	UN	WL		M	IND	IND	IND	DDE		
2631	NA					SURFACE	CM	25.4	21.2	7.5		7.3	5.00	FL	TR	EX	OV
	5K	19.7	IR	S	UN	WL	M	UN	IR		M	NA	NA	NA	DDE		
2379	NA		26S 16E		SW	0-10 (1)	CM	18.6	19.4	6.3		6.3	2.56	FL	TR	OV	OV
	10	19.3	WL	S	UN	IR	A	UN	WL,USE		A	BF	WL	A	DDE		
4876	R#5-IN		14S 8E			SURFACE	PCM	21.3	18.7	6.4		6.4	2.95	FL	TR	EX	TR
	5B	18.8	WL	S,P	UN	WL,USE	A	AB	NA		A	AB	NA	NA	DDE		

See Appendix II for explanation of abbreviations.

Table 8: General characteristics of ancillary features following the 1978 investigations.

FEATURE NO.	TYPE OF FEATURE	EXCAVATED	SIZE (cm)	DEPTH (cm)	SHAPE IN PROFILE	STAINS	LITHICS	TOOLS	BONE OR CHARCHOAL	FBR NO/WT(kg)
1	refuse pile	Yes	420x150	7-11	Flat to irregular	2 small black	1681	3	30.52 g	1919/79.94
2	FBR pile	Yes	70x100	10-12	Irregular	None	17	0	None	214/13.75
3	Hearth	Yes	46x46	9	Bucket	Black Interior Orange Outline	123	0	34.5	5/-
	12 Post molds	Yes (5)	2 to 3	5-6	Oval to Pointed	Dark	1	0	None	0/0
4	Refuse pile	No	70x60			None	Present	0	None	Present
5	Refuse pile	No	100x60			None	Present	0	None	Present
6	FBR pile	No	130x70			None	0	0	None	Present
7	Refuse pile	No	100x110			None	Present	Core	None	Present
8	Stain - possible hearth	No	20x15			Black	0	0	None	0/0
9	Refuse pile	No	80x50			None	Present	0	Present	Present
10	Stain - possible hearth	No	30x50			Red & black	0	0	None	0/0
11	Refuse pile	No	120x120			None	Present	0	Present	Present
12	Hearth	No	30x30			Black/circular	0	0	Present	0/0
13	FBR Pile	No	110x50			None	Present	0	None	Present
14	Refuse pile	No	220x130			None	Present	0	None	Present
15	Refuse pile	No	60x50			None	Present		None	Present

Table 8: Continued

FEATURE NO.	TYPE OF FEATURE	EXCAVATED	SIZE (cm)	DEPTH (cm)	SHAPE IN PROFILE	STAINS	LITHICS	TOOLS	BONE OR CHARCHOAL	FBR NO/WT(kg)
16	FBR pile	No	110x60			None	Present	0	None	Present
17	FBR pile	No	110x70			None	Present	0	None	Present
	Refuse pile	No	70x60			None	Present	2 broken bifaces	None	Present
18	Hearth	Yes	40x35	5-7	Shallow basin	Black			0.44 g	0.1
19	Black stain	Yes	9	2	Saucer	Black	Present	0	1.60 g	Present
	Post mold	Yes	1	3	Pointed stick	Black	Present	0		
	Hearth	Yes	80x60	2	Flat	Black & red	Present	0	None	0/0
20	Black stain	Yes	24x27	10	Basin	Black & red	8	0	None	0/0
	Black stain	Yes	17x15	3-4	Basin	Black & red	0	0	None	0/0
21	Knapping area	Yes	100x100	N/A	N/A	None	107	0	None	7/0.75
22	Knapping area	Yes		N/A	N/A	None	6	0	None	0/0
23	6 small depressions	Yes	15x20	3-5	Basin	None	196	0	None	4/0.20

FBR: fire broken rock

Table 9: Data on small depressions near Stone Circle 5.

LOCATION	ASSOCIATION	LITHIC MATERIAL FREQUENCY	FIRE BROKEN ROCK FREQUENCY	FIRE BROKEN ROCK WT.(g)	DISTANCE FROM FEATURE 21
10S-4E(A)	Ring 5-Inside	0	0	0	0.70 m
10S-4E(C-D)	Ring 5-Outside	23	0	0	1.40 m
10S-4E(D-E)	Ring 5-Outside	8	0	0	1.50 m
10S-4E(F-L)	Ring 5-Outside	0	0	0	0.40 m
10S-4E(k)	Ring 5-Outside	165	4	0.20	0.90 m
14S-12E(H)	Ring 5-Outside	0	0	0	3.50 m

Table 11: Material association and distribution at Ring 5.

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	1,407/85.4 kg	1,080/6,387 kg	2,487/6,472.4 kg
Lithics	2,377	3,211	5,588
Points	0	0	0
Endscrapers	1(#4876)	2(#1344,1495)	3
Biface	1	0	1
Features	0	4	4
Central Hearths	1	0	1
Post Molds	1	0	1
Bone & Charcoal	15.5 g	59 g	74.5 g

Table 10: Stone circle characteristics from D10p-2.

		STONE DEPTHS (cm)			STONE WEIGHTS (kg)			INSIDE RING DIAMETER			RING COMPLETENESS		RING CIRCUMFERENCE		
STONE CIRCLE	NO.	RANGE	MEAN	S.D.	RANGE	MEAN	S.D.	N-S	E-W	MEAN	COMPLETE	PARTIAL	CIRCUM.	DENSITY (per m)	AREA (m^2)
1	44	8-18	12.78	2.8	1.0-15.4	7.03	3.1	5.5	5.7	5.6	x		17.6	2.61	24.63
2	94	9-17	13.29	8.5	2.1-13.0	6.66	2.3	7.3	8.0	7.65			23.26	4.04	45.96
3*	14	10-24	15.57	3.8	1.5-20	8.16	6.7	-	-	-		x	-	-	-
4	42	8-19	14.12	2.4	2.5-+20	8.25	4.0	6.2	6.0	6.1	x		19.17	2.19	29.23
5	112	4-20	11.82	3.6	2.0-+20	6.63	3.9	6.5	6.4	6.45	x		20.27	5.33	32.68
6	132	4-24	9.94		.75-+20	4.30	3.0	6.3	6.6	6.45	x		20.27	6.51	32.68
7	70	5-20	11.48	3.4	1.0-+20	7.04	4.4	6.0	5.8	5.9	x		18.54	3.78	27.34
8	36	9-19	13.87	3.2	3.5-+20	9.00	4.0	7.3	7.7	7.5	x		22.16	1.62	44.88
9	35	3.5-18	11.45	3.3	1.5-+20	7.1	3.4	5.6	5.8	5.7		x			25.52
10**	57	3-21	13.89	6.7	.5-15.3	5.2	3.2	8.0	8.0	8.0	x		25.14	2.27	50.27
11**	35	5-28	15.29	4.5	1.0-+20	7.0	5.9	7.7	7.4	7.55	x		19.64	1.78	44.77
12**	48	4.24	13.21	4.8	20-13.6	5.75	2.6	7.3	6.9	7.1	x		22.31	2.15	39.59
13**	19	6-18	12.37	2.9	1.1-10.7	4.81	2.8	6.2	7.35	6.78		x			36.10
14**	33	6-24	14.47	5.2	.6-13.3	5.19	2.8	5.8	6.1	5.93	x		19.74	1.67	27.62
15	46	3-18	10.63	3.4	.6-15.4	5.52	3.7	-	7.5	7.5		x			44.18
16	24	4.12	7.67	2.2	1.0-11.0	5.56	2.7	3.0	3.25	3.12		x			7.65
17	32	5-13	8.66	2.0	1.9-11.5	5.29	2.8	3.0	3.5	3.25			10.21	3.13	8.30
18	22	8-18	11.86	2.4	3.1-15.6	6.35	2.9	-	5.8	5.8		x			26.42
19*	Not a ring		-	-	-	-	-	-	-	-	-	-	-	-	-
20**	30	15-20	16.63	2.8	3.5-16.8	8.01	3.3	Buried	6.0	6.0		1/2			28.27

* Analysis determined not a stone circle.
** Located in stripped portion of site, thus depths calculated.

cm = centimetres
m = metres
kg = kilogram
S.D. = standard deviation
Circum. = circumference

Table 12: Select metric and non-metric data, Stone Circle 5, D10p-2.

- Calculated Inside Diameter: 6.09 m
- Calculated Outside Diameter: 7.24 m
- Calculated Circumference: 19.1 m
- Depth of Base of Stones Below Surface:
  Range: 4-24 cm Mean: 11.3 cm n= 112
- Individual Stone Weights:
  Range: 2-19.5 kg Mean: 6.5 kg n= 109 (excluding rocks without exact Wt)
  2-21 6.7 kg 111 (including two " > 20" rocks as Wt 21)

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	18	14	13	12	10	7	7	31	112
Stone Weight (kg)	120.8	112.4	137.8*	82.9*	48.1	35.6	50.8	163.2	751.6
Percentage Frequency of Stones by Number	16.1	12.5	11.6	10.7	8.9	6.3	6.3	27.7	100.1
Percentage Frequency of Stones by Weight	16.1	15.0	18.3	11.0	6.4	4.7	6.8	21.7	100.1
Number of Stones per Metre of Circumference	7.5	5.9	5.4	5.0	4.2	2.9	2.9	13.0	mean 5.8
Stone Weight per Metre of Circumference (kg)	50.6	47.1	57.7	34.7	20.1	14.9	21.3	68.4	39.4

* > 20 = 21 kg

Table 13: Stone weights and depths for Stone Circle 5, D10p-2.

NUMBER	WEIGHT	DEPTH
1	2.5	5.0
2	3.4	6.0
3	2.1	7.5
4	5.2	9.0
5	4.1	8.0
6	3.5	8.0
7	5.0	10.0
8	12.1	9.5
9	3.1	10.0
10	7.1	16.5
11	>20.0	24.0
12	4.5	10.0
13	3.5	8.0
14	8.5	9.0
15	6.2	9.0
16	8.0	10.0
17	5.2	8.5
18	4.5	10.5
19	2.6	8.0
20	5.4	9.5
21	2.5	7.0
22	11.0	10.0
23	7.3	10.5
24	14.4	10.0
25	9.7	8.5
26	17.2	10.0
27	>20.0	10.0
28	6.8	7.0
29	5.2	7.5
30	19.5	9.5
31	12.0	7.5
32	6.7	7.5
33	7.6	7.5
34	3.4	7.0
35	7.0	8.0
36	11.7	11.0
37	8.6	9.0
38	4.0	7.5
39	7.4	9.0
40	7.9	8.5
41	15.0	11.0
42*	4.4	9.0
43	11.1	11.0
44	13.0	11.0
45	5.5	11.0
46	4.5	11.5
47	5.6	10.5
48	6.1	11.0
49	6.0	11.0
50	6.0	11.5
51	6.0	14.0
52	6.5	12.5
53	6.6	14.0
54	8.6	15.0
55	16.6	12.5
56	7.6	12.5
57*	3.0	13.5
58*	3.2	12.0
59	8.0	11.0
60	6.5	13.5
61	2.9	12.5
62	10.2	15.0
63	3.0	14.0
64	7.2	12.5
65	4.0	13.5
66	4.6	12.0
67	6.0	15.0
68	10.3	17.0
69	5.1	16.0
70	6.4	16.0
71	2.2	12.5
72	4.0	15.0
73	-	15.0
74	5.1	17.0
75	3.0	10.5
76	10.0	17.0
77	4.6	12.0
78	8.6	12.5
79	15.0	20.0
80	4.4	11.0
81	3.1	11.5
82	6.5	11.5
83	3.0	14.5
84	5.5	15.5
85	2.2	13.0
86	5.5	13.0
87	6.5	17.0
88	10.5	17.0
89	2.5	14.0
90	2.7	11.5
91	3.0	13.0
92	2.0	11.0
93	3.4	12.0
94	3.5	9.0
95	4.5	12.5
96	7.1	15.0
97	16.5	20.0
98	6.6	16.0
99	2.0	10.5
100	3.5	9.5
101	5.0	8.0
102	2.5	9.5
103	12.5	19.0
104	10.0	19.0
105	4.6	9.0
106	8.0	9.0
107	4.5	8.0
108	4.6	8.0
109	4.5	6.0
110	7.4	9.5
111	7.1	7.5
112	4.5	7.0
113	3.7	8.5
114	5.0	5.0
115	3.4	4.0
116*	5.0	-
117*	4.0	-
118*	14.5	-

* not included in stone circle analysis

Weight = kg
Depth = cm

Table 14: Material association and distribution at Ring 12.

ARTIFACTS	FEATURE 1	INSIDE	OUTSIDE	TOTAL
FBR	1297/78 kg	447/34.1 kg	353/20.0 kg	2097/132.2 kg
Lithics	1681	1480	726	3887
Points	0	1 (#4866)	0	1
End Scrapers	0	2 (#4514, #4867)	2 (#3967, #4441)	4
Bifaces	3 (#3075, #3573, #2930)	3 (#4403, #4408, #2560)	1 (#4498)	7
Features	0	1 (FBR pile)	0	2
Central Hearth	0	no	0	no
Post Molds	0	no	0	no
Bone & Charcoal	30.5	2.8	0	33.3

Table 16: Stone weights and depths for Stone Circle 12, D10p-2.

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	5.2	10.0	21	7.3	18.0	41	5.6	24.0
2	9.0	12.0	22	5.1	16.0	42	11.2	23.0
3	6.5	8.0	23	5.6	16.0	43	8.0	21.0
4	3.6	9.0	24	2.5	16.0	44	8.5	21.0
5	5.0	10.0	25	4.5	14.0	45	7.0	18.0
6	2.0	9.0	26	5.5	15.0	46	6.0	14.0
7	2.1	11.0	27	2.1	6.0	47	13.6	22.0
8	4.0	13.0	28	6.0	6.0	48	8.8	18.0
9	2.9	9.0	29	3.6	4.0			
10	6.1	17.0	30	8.9	5.0			
11	8.0	13.0	31	8.0	8.0			
12	2.5	12.0	32	5.0	10.0			
13	4.1	18.0	33	5.6	9.0			
14	10.4	16.0	34	5.0	7.0			
15	3.0	14.0	35	5.1	9.0			
16	7.2	14.0	36	4.0	10.0			
17	4.0	16.0	37	10.5	13.0			
18	7.5	18.0	38	3.0	9.0			
19	3.6	15.0	39	4.0	11.0			
20	3.3	14.0	40	6.1	13.0			

Weight = kg
Depth = cm

Table 15: Select metric and non-metric data, Stone Circle 12, D10p-2.

- Calculated Inside Diameter: 7.02 m
- Calculated Outside Diameter: 7.75 m
- Calculated Circumference: 22.1 m
- Depth of Base of Stones Below Surface:
  Range: 4-24 cm Mean: 13.3 cm n= 47
- Individual Stone Weights:
  Range: 2-13.6 kg Mean: 5.8 kg n= 47

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	6	7	2	4	5	4	6	13	47
Stone Weight (kg)	30.5	63.1	11.7	22.6	32.5	16.9	28.2	66.6	272.1
Percentage Frequency of Stones by Number	12.8	14.9	4.3	8.5	10.6	8.5	12.8	27.7	100.1
Percentage Frequency of Stones by Weight	11.2	23.2	4.3	8.3	11.9	6.2	10.4	24.5	100
Number of Stones per Metre of Circumference	2.2	2.5	0.7	1.4	1.8	1.4	2.2	4.7	2.1
Stone Weight per Metre of Circumference (kg)	11.0	22.8	4.2	8.2	11.8	6.1	10.2	24.1	12.3

* Data not available or indeterminate.

Table 17: Material Association and Distribution at Stone Circle 10

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	2,414/128,095g	687/18,916 g	3,101/147,011
Lithics	2620	759	3379
Points	0	1(#19436)	1
End Scraper	1(#9398)	0	1
Bifaces	0	0	0
Features	2 (refuse piles)	1 (refuse pile)	3(#28,31,6)
Central Hearth	yes	0	1(#25)
Post Molds	?	0	0
Bone & Charcoal	362/121.4 g	3/0.6 g	365/122 g

Table 19: Stone Weights and Depths for Stone Circle 10, D10p-2

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	7.8	16.0	26	8.9	18.0
2	8.7	14.0	27	5.5	18.0
3	4.6	14.0	28	2.0	15.0
4	1.7	6.0	29	2.5	15.0
5*	3.1	8.0	30*	4.9	17.0
6	4.3	12.0	31	6.5	17.0
7*	7.2	15.0	32	1.9	15.0
8*	1.4	11.0	33	1.6	15.0
9	5.8	15.0	34	4.4	16.0
10	3.7	13.0	35	4.1	17.0
11	3.4	13.0	36	7.5	18.0
12	3.3	13.0	37	4.1	14.0
13	3.7	14.0	38	6.0	17.0
14	5.0	15.0	39	7.4	17.0
15*	5.5	15.0	40	7.0	16.0
16*	5.0	15.0	41	7.3	16.0
17	3.0	16.0	42	15.3	18.0
18	2.6	19.0	43	11.0	16.0
19	3.6	19.0	44	6.9	14.0
20*	3.0	21.0	45	5.1	19.0
21*	6.9	15.0	46	12.6	9.0
22	2.9	13.0	47	1.4	11.0
23	1.9	18.0	48	7.2	12.0
24*	1.9	14.0	49	3.7	11.0
25	-	-	50	6.0	11.0

Table 19: Continued

NUMBER	WEIGHT	DEPTH
51	6.0	5.0
52	9.2	3.0
53	14.3	8.0
54	3.0	10.0
55	0.5	3.0
56	2.4	6.0
57	9.0	8.0
58*	1.5	9.0
59*	4.7	6.0
60	5.9	-
61	5.0	-
62	2.3	-
63	2.7	-
64	3.2	-
64	7.3	-
66*	5.0	-
67	4.1	-
68	3.2	-
69	2.3	-
70	3.2	-
71	2.7	-
72	2.3	-
73*	3.2	-
74*	3.2	-
75	4.1	-
76	0.5	-
77	1.8	-
78	7.7	-
79	3.2	-
80	2.3	-
81	4.5	-
82	1.8	-
83	1.8	-
84	1.8	-
85	1.4	-
86	3.6	-
87	2.3	-
88	2.7	-
89	9.1	-
90	3.2	-
91	3.6	-
92	2.3	-
93	4.1	-
94	4.1	-
95	4.5	-
96	5.9	-
97	5.4	-
98	5.0	-
99	1.4	-
100	1.4	-
101	0.5	-
102	1.4	-
103	2.7	-
104	1.4	-
105	1.8	-
106	2.3	-
107	3.6	-
108	2.3	-
109	7.7	-
110	6.8	-
111	3.2	-
112	4.1	-
113	1.8	-
114	4.5	-
115	2.7	-
116	3.2	-
117	1.4	-
118	1.4	-
119	2.7	-
120	1.4	-
121	1.8	-
122	1.4	-
123	1.8	-
124	1.4	-
125	1.8	-
126	5.4	-
127	2.3	-
128	0.9	-
129	0.9	-

* not included in stone circle analysis

Weight = kg
Depth = cm

Table 18: Select metric and non-metric data, Stone Circle 10, D10p-2

- Calculated Inside Diameter: 8.03 m
- Calculated Outside Diameter: 9.20 m
- Calculated Circumference: 25.20 m
- Depth of Base of Stones Below Surface:
  Range: 3-19 cm Mean: 13.6 cm n= 47
- Individual Stone Weights:
  Range: 0.5 - 15.3 kg Mean: 4.1 kg n= 114

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	11	16	13	10	13	5	26	20	114
Stone Weight (kg)	72	60.3	47	35.4	60.8	29.2	88.9	74.2	467.8
Percentage Frequency of Stones by Number	9.6	14.0	11.4	8.8	11.4	4.4	22.8	17.5	99.9
Percentage Frequency of Stones by Weight	15.4	12.9	10.0	7.6	13.0	6.2	19.0	15.9	100
Number of Stones per Metre of Circumference	3.5	5.1	4.1	3.2	4.1	1.6	8.3	6.3	mean 4.5
Stone Weight per Metre of Circumference (kg)	22.9	19.1	14.9	11.2	19.3	9.3	28.2	23.6	18.6

* Data not Available or Indeterminate

Table 20: Material association and distribution at Stone Circle 11.

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	1,593/80,577 g	142/4,067 g	1,735/84,644 g
Lithics	2,583	651	3,234
Points	3(#2333,14377,14214)	0	3
End Scrapers	1(#11911)	0	1
Bifaces	2(#14374,13850)	1(#14781)	3
Features	3 (refuse piles)	1 (? hearth)	4(#24,26,27,30)
Central Hearth	?	0	0
Post Molds	yes	0	1(#29)
Bone & Charcoal	51/14.7 g	2/0.5 g	53/15.2 g

Table 21: Stone weights and depths for Stone Circle 11, D10p-2.

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	4.4	15.0	31	8.2	20.0	61	1.8	-
2*	7.0	-	32	6.7	18.0	62	2.3	-
3	2.7	15.0	33	7.4	18.0	63	3.2	-
4	1.6	5.0	34	13.9	21.0	64	3.2	-
5	9.0	19.0	35	6.0	19.0	65	1.4	-
6	8.0	17.0	36	2.3	-	66	5.0	-
7	8.5	12.0	37	9.1	-	67	1.8	-
8	>20+	18.0	38	4.5	-	68	1.8	-
9	7.5	9.0	39*	0.9	-	69	2.3	-
10	1.6	12.0	40*	6.8	-	70	1.4	-
11*	4.6	18.0	41*	7.3	-	71	5.0	-
12	1.7	13.0	42	1.8	-	72	1.8	-
13	2.1	16.0	43*	3.6	-	73	2.3	-
14*	11.7	15.0	44	1.8	-	74	8.6	-
15*	6.4	11.0	45	4.1	-			
16*	8.5	16.0	46	3.6	-			
17*	2.6	13.0	47	4.5	-			
18*	6.9	15.0	48	5.0	-			
19	10.4	15.0	49	2.7	-			
20	14.6	16.0	50	1.4	-			
21	6.7	13.0	51	1.8	-			
22	7.2	14.0	52	2.7	-			
23	1.3	8.0	53	2.3	-			
24	10.0	28.0	54	2.3	-			
25	1.9	11.0	55	3.2	-			
26	2.0	11.0	56	2.7	-			
27	1.0	12.0	57*	0.9	-			
28*	1.9	13.0	58	1.8	-			
29	8.3	22.0	59	0.9	-			
30*	6.0	22.0	60	5.4	-			

* not included in analysis of stone circles

Weight = kg
Depth = cm

Table 22: Material Association and Distribution at Stone Circle 13

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	1,530/140,120 g	308/10,913 g	1,838/201,033 g
Lithics	1125	201	1326
Points	3(#14960, 15968, 15888)	0	3
End Scrapers	1 (#15996)	1 (#16027)	2
Bifaces	0	0	0
Features	2 (FBR piles)	0	2 (#35,39)
Central Hearth	Yes	0	1 (#34)
Post Molds	0	0	0
Bone & Charcoal	20/13.3 g	38/17.9 g	58/31.2 g

Table 24: Stone Weights and Depths for Stone Circle 13, D10p-2

NUMBER	WEIGHT	DEPTH
1	3.7	14.0
2	5.9	15.0
3	2.5	13.0
4	3.0	13.0
5	5.9	12.0
6*	10.7	13.0
7*	4.1	12.0
8*	1.6	12.0
9*	1.3	9.0
10*	1.9	-
11*	1.1	10.0
12*	1.0	-
13*	2.1	13.0
14*	0.9	-
15	2.8	13.0
16*	1.8	-
17	6.5	6.0
18	6.0	7.0
19	5.0	14.0
20	10.6	16.0
21	7.9	12.0
22	5.1	13.0
23	5.6	18.0
24	4.1	-
25	4.1	-
26	3.2	-
27	0.9	-
28	4.1	-
29	10.4	-
30	3.6	-
31	2.3	-
32	7.7	-
33	7.7	-
34	2.3	-
35	9.5	-
36	2.3	-
37	2.7	-
38	5.0	-
39	5.9	-
40	4.1	-
41*	1.4	-
42	3.6	-
43	5.0	-
44	5.0	-
45	2.7	-
46	1.4	-
47	5.0	-
48*	2.7	-
49*	2.3	-
50	2.3	-
51	4.5	-

* not included in stone circle analysis

Weight = kg
Depth = cm

Table 23: Select metric and non-metric data, Stone Circle 13, D10p-2, partial ring.

- Calculated Inside Diameter: 7.36 m
- Calculated Outside Diameter: 8.60 m
- Calculated Circumference: 23.12 m
- Depth of Base of Stones Below Surface:
  Range: 6-18 cm Mean: 12.8 cm n= 13
- Individual Stone Weights:
  Range: 0.9 - 106 kg Mean: 4.8 kg n= 36

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	0	2	0	8	6	10	9	1	36
Stone Weight (kg)	0	6.8	0	32.4	30.5	52.5	45.8	5.0	173.0
Percentage Frequency of Stones by Number	0	5.5	0	22.2	16.7	27.8	25.0	2.8	100
Percentage Frequency of Stones by Weight	0	3.9	0	18.7	17.6	30.3	26.5	2.9	99.9
Number of Stones per Metre of Circumference	0	0.7	0	2.8	2.1	3.5	3.1	0.3	mean 1.6
Stone Weight per Metre of Circumference (kg)	0	2.4	0	11.2	10.6	18.2	15.8	1.7	7.5

* Data not Available or Indeterminate

Table 25: Material association and distribution at Stone Circle 14.

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	193/55,540 g	533/13,249 g	726/68,789 g
Lithics	411	305	716
Points	3(#16407,16460,16270)	0	3
End Scrapers	0	1(#165522)	1
Bifaces	1(#16464)	0	1
Features	1 (FBR pile)	0	1(#33)
Central Hearth	yes	0	1(#32)
Post Molds	yes	0	1(#32)
Bone & Charcoal	40/9.2 g	10/10.8 g	50/20 g
Ceramics	34	5	39

Table 27: Stone weights and depths for Stone Circle 14, D10p-2.

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	5.0	13.0	32	4.5	9.0	63	1.4	-
2	9.5	14.0	33	2.0	7.0	64*	4.1	-
3*	-	-	34	1.9	8.0	65*	3.2	-
4	4.0	12.0	35	4.5	6.0	66*	2.3	-
5	1.3	9.0	36	6.3	12.0	67	2.7	-
6	9.1	12.0	37	6.4	11.0	68	2.3	-
7*	2.0	12.0	38*	3.8	-	69	2.3	-
8	6.2	19.0	39	1.8	-	70	3.2	-
9	4.1	19.0	40	1.4	-	71	2.3	-
10	4.1	18.0	41	5.9	-	72	4.1	-
11	7.0	23.0	42	1.8	-	73	3.6	-
12	6.1	22.0	43	2.3	-	74	1.4	-
13	3.7	22.0	44	6.8	-	75	3.2	-
14	6.7	12.0	45	4.5	-	76	1.4	-
15	5.1	24.0	46	3.2	-	77	4.1	-
16	4.2	24.0	47	3.6	-	78	3.2	-
17*	1.3	-	48	1.4	-	79	3.2	-
18*	1.8	-	49	1.4	-	80	2.3	-
19*	0.6	22.0	50	2.3	-	81	2.3	-
20*	8.6	-	51	5.0	-	82	3.2	-
21	5.6	18.0	52	4.1	-	83	2.7	-
22	2.6	15.0	53	4.1	-	84	5.0	-
23	5.0	18.0	54	1.8	-	85	1.8	-
24	3.5	9.0	55	11.3	-			
25	4.6	13.0	56	3.6	-			
26	10.6	13.0	57	2.3	-			
27	7.5	12.0	58	5.0	-			
28*	5.6	11.0	59	1.4	-			
29*	0.7	-	60	1.8	-			
30	8.4	11.0	61	1.4	-			
31	13.3	13.0	62	1.8	-			

* Stones not included in stone circle analysis

Weight = kg
Depth = cm

Table 26: Select metric and non-metric data, Stone Circle 14, D10p-2.

- Calculated Inside Diameter: 6.06 m
- Calculated Outside Diameter: 7.15 m
- Calculated Circumference: 19.0 m
- Depth of Base of Stones Below Surface:
  Range: 6-24 cm Mean: 14.4 cm n= 29
- Individual Stone Weights:
  Range: 1.3 - 13.3 kg Mean: 4.1 kg n= 73

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	2	0	5	18	13	14	13	8	73
Stone Weight (kg)	8.2	0	16.6	69.9	52.3	70.2	60.4	20.9	298.5
Percentage Frequency of Stones by Number	2.7	0	6.8	24.7	17.8	19.2	17.8	11.0	100
Percentage Frequency of Stones by Weight	2.7	0	5.6	23.4	17.5	23.5	20.2	7.0	99.9
Number of Stones per Metre of Circumference	0.8	0	2.1	7.6	5.5	5.9	5.5	3.4	mean 3.8
Stone Weight per Metre of Circumference (kg)	3.5	0	7.0	29.4	22.0	29.6	25.4	8.8	15.7

* Data not Available or Indeterminate

Table 28: Material Association and Distribution at Stone Circle 16

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	550/52,363 g	469/31,684 g	1,019/84,011 g
Lithics	383	633	1,016
Points	0	0	0
End Scraper	0	0	0
Bifaces	0	0	0
Features	1(Hearth)	1(Hearth)	2(#40,41)
Central Hearth	0	0	0
Post Mold	yes	0	yes
Bone & Charcoal	25/10.8 g	0	25/10.8 g

Table 30: Stone Weights and Depths for Stone Circle 16, D10p-2

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	3.6	6.0	26	2.3	-
2	7.7	6.0	27	3.6	-
3	4.0	9.0	28	5.0	-
4	6.2	5.0	29*	5.0	-
5	3.2	7.0	30*	5.0	-
6	6.4	8.0	31*	5.0	-
7	8.2	9.0	32	5.9	-
8	11.0	9.0	33	6.8	-
9	5.0	disturbed	34	4.1	-
10	3.9	disturbed	35*	5.9	-
11	6.5	disturbed	36	5.0	-
12	5.5	disturbed	37	1.4	-
13	4.4	disturbed	38	4.5	-
14	2.3	8.0	39	1.4	-
15	1.0	4.0	40	1.4	-
16	1.6	disturbed	41	1.4	-
17	5.1	9.0	42*	4.1	-
18	6.8	7.0	43*	4.5	-
19	10.5	9.0			
20	8.0	6.0			
21	3.9	6.0			
22	5.9	12.0			
23	4.5	6.0			
24	10.4	12.0			
25	-	-			

* stones not included in stone circle analysis

Weight = kg
Depth = cm

Table 29: Select metric and non-metric data, Stone Circle 16, D10p-2.

- Calculated Inside Diameter: 3.3 m
- Calculated Outside Diameter: 4.3 m
- Calculated Circumference: 13.5 m
- Depth of Base of Stones Below Surface:
  Range: 4-12 cm Mean: 7.7 cm n= 18
- Individual Stone Weights:
  Range: 1-11 kg Mean: 4.96 kg n= 178.4

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	1	2	2	3	4	5	4	13	34
Stone Weight (kg)	*	*	*	*	*	*	*	*	178.4
Percentage Frequency of Stones by Number	2.9	5.9	5.9	8.8	11.8	14.7	11.8	38.2	100
Percentage Frequency of Stones by Weight	*	*	*	*	*	*	*	*	*
Number of Stones per Metre of Circumference	0.6	1.2	1.2	1.8	2.4	2.9	2.4	7.7	mean 2.5
Stone Weight per Metre of Circumference (kg)	*	*	*	*	*	*	*	*	13.2

* Data not Available or Indeterminate

Table 31: Material association and distribution at Stone Circle 17.

ARTIFACTS	INSIDE	OUTSIDE	TOTAL
FBR	39/6,571.6 g	585/22,157.7 g	624/28,729.3 g
Lithics	442	609	1051
Points	0	0	0
End Scrapers	0	0	0
Bifaces	0	1	1
Features	0	1 (Hearth)	1(#42)
Central Hearth	0	0	0
Post Molds	0	0	0
Bone & Charcoal	0	87/16.5 g	87/16.5 g

Table 33: Stone weights and Depths for Stone Circle 17, D10p-2.

NUMBER	WEIGHT	DEPTH	NUMBER	WEIGHT	DEPTH
1	4.3	7.0	29	4.8	11.0
2	2.7	7.0	30	2.2	11.0
3	5.8	7.0	31	6.0	9.0
4	9.4	13.0	32	7.1	10.0
5	11.5	10.0	33	2.4	6.0
6	3.4	8.0	34	2.9	9.0
7	8.5	8.0	35*	1.6	7.0
8	10.2	7.0	36*	3.2	9.0
9	5.1	7.0	37	3.2	-
10*	1.0	disturbed	38	2.7	-
11*	depression	4.0	39	6.8	-
12	10.5	6.0	40	2.3	-
13	10.3	7.0	41	1.4	-
14	7.0	5.0	42	2.3	-
15	2.3	7.0	43	2.3	-
16	2.0	7.0	44	11.8	-
17	4.7	9.0	45*	14.1	-
18	1.9	7.0			
19	4.9	11.0			
20	4.3	9.0			
21	5.7	8.0			
22	7.1	11.0			
23	6.9	9.0			
24	3.9	9.0			
25	2.6	11.0			
26	4.5	12.0			
27	5.0	10.0			
28	5.2	9.0			

* not included in stone circle analysis

Weight = kg
Depth = cm

Table 32: Select metric and non-metric data, Stone Circle 17, D10p-2.

- Calculated Inside Diameter: 2.82 m
- Calculated Outside Diameter: 3.66 m
- Calculated Circumference: 8.9 m
- Depth of Base of Stones Below Surface:
  Range: 5-13 cm Mean: 8.7 cm n= 32
- Individual Stone Weights:
  Range: 1.4-11.8 kg Mean: 5.2 kg n= 40

MEASUREMENT AND INDICES	N	NE	E	SE	S	SW	W	NW	TOTAL
Number of Stones	5	3	9	4	10	4	1	4	40
Stone Weight (kg)	33.7	13.2	35.4	23.6	28.4	35.9	10.5	27.2	207.9
Percentage Frequency of Stones by Number	12.5	7.5	22.5	10.0	25.0	10.0	2.5	10.0	100
Percentage Frequency of Stones by Weight	16.2	6.3	17.0	11.4	13.7	17.3	5.1	13.1	100.1
Number of Stones per Metre of Circumference	4.5	2.7	8.1	3.6	9.0	3.6	0.9	3.6	4.5
Stone Weight per Metre of Circumference (kg)	30.3	11.9	31.8	21.2	25.5	32.3	9.4	24.4	23.4

* Data not Available or Indeterminate

Table 34: Ancillary Feature Characteristics from Ross Glen.

Feature	Type	Dug	Size (cm)	Depth (cm)	Shape in Profile	Stains	Debitage	Tools	Bone or Carbon #/Wt	F.C.R.	
										No.	Wt.(gms)
4	FBR pile	yes	105x 125	0-5	irregular	none	24	0	none	226	7097
5	Refuse pile	no	100x 60			none	present	0	none	present	
6	FBR pile	yes	155x 150	10-15 (est.)	flat	none	70	0	none	518	40,878
7	Boiling pit	yes	60x 58	3-23	basin	charcoal black stain on rock	0	0	15/1.4 g	582	43,982
8	Hearth	no	20x 15			black	0	0	none	0	0
9	Hearth	yes	48x 49	0-7	irregular basin shape	ash fire-reddened	4	0	100/41.4 g	0	0
10	Hearth with	yes	32x 28	7-13	basin to saucer	black & orange	0	0	none	0	0
	Post Molds (n=7)		diam. 2	length range 1-5	cylinder	dark stain	0	0	none	0	0
11	Knapping Area	yes	173x 110	3-5	flat	none	190	0	19/2.7 g	85	1241
12	Hearth	yes	38x 43	0-12	basin	dark	0	0	100/594 g	0	0

Table 34: Continued

Feature	Type	Dug	Size (cm)	Depth (cm)	Shape in Profile	Stains	Debitage	Tools	Bone or Carbon #/Wt	F.C.R.	
										No.	Wt.(gms)
13	FCR pile	no	110x 50			none	present	0	none	present	
14	Refuse pile	yes	250x 200	7-10	flat	none	234	0	40/4.5 g	619	22,735
15	Refuse pile	yes	173x 182	5-10	flat	none	38	0	none	129	3,439
16	FBR pile	yes	55x 68	5-10	flat	none	2	0	none	48	3,941
17(a)	FBR pile	no	110x 70			none	present	0	none	present	
24	Refuse pile	yes	100x 80 (est.)	IND	irregular	none	155	0	31/8.3 g	278	24,243
25	Hearth with Post Mold (n=1)	yes	32x 42 (est.)	0-15	saucer	black & orange	0	0	none	0	0
			Dia.= 2	length 4.5	cylinder	red			charcoal present		
26	Hearth	yes	16.5x 21	10- 16.5	saucer	grey fill black rim	0	0	none	0	0
27	Refuse pile	yes	125x 81	10-18	irregular	none	105	0	none	153	5,860

Table 34: Continued

Feature	Type	Dug	Size (cm)	Depth (cm)	Shape in Profile	Stains	Debitage	Tools	Bone or Carbon #/Wt	F.C.R. No.	F.C.R. Wt. (gms)
28	Refuse pile	yes	285x 215	6-15 (est.)	basin	none	147	0	347/113.6g	958	77,604
		yes	est. ?		flat to irregular	none					
29	Post Mold	yes	diam. 2 length 5	19-24	cylinder	charcoal	0	0	none	0	0
30	Hearth	yes	40x 40	2-22	basin	black	9	0	charcoal present	1	149.2
31	Refuse pile	yes	100x 74	5-10	irregular	none	51	2 MRST	2/0.1 g	166	8,749
32	Hearth with Post Mold (N=1)	yes	42x 45	4-10	saucer	charcoal	9	0	25/3.3 g	4	5,314.6
			diam. 2.5 length 2.0		cylinder						
33	FBR pile	yes	112x 72	6-14	irregular	none	4	0	none	544	33,252
34	Hearth	yes	47x 58 (est.)	10-20.5	saucer	red charcoal	14	0	2/0.1 g charcoal present	41	23,209.2
35	FBR pile	yes	120x 130 (est.)	10-15 (est.)	flat	none	17	1 core	3/1 g	306	139,011.5

Table 34: Continued

Fea-ture	Type	Dug	Size (cm)	Depth (cm)	Shape in Profile	Stains	Debitage	Tools	Bone or Carbon #/Wt	F.C.R. No.	F.C.R. Wt.(gms)
36	Knapping Area	yes	140x 130	5-10	flat	none	41	1 MRST	none	17	208
37	Hearth	yes	23x 24	12-23	basin	red charcoal	0	0	none	0	0
39	FBR pile	yes	115x 135 (est.)	8-12 (est.)	flat	none	5	1	none	104	3,316.7
40	Hearth with Post Mold	yes	27x 35 diam. 3 (est.)	10-13	flat to irregular	charcoal	70	1 core	23/10 g	212	24,760.7
	Boiling pit	yes	54x 53	10-37	bucket	black red/brown					
41	Hearth	yes	36x 34	7-13	basin	dark lighter	IND	0	none	0	0
42	Boiling pit	yes	60x 50	7-22	basin	red, black charcoal	2	0	73/9.2 g	177	8,452.1

Table 35: Distribution of All Lithic Debitage by Feature for D10p-2.

Location	Inside	Outside
*Ring 10	2620	759
*Ring 11	2583	651
*Ring 13	1125	201
*Ring 14	411	305
*Ring 16	383	633
*Ring 17	442	609
*Feature 4	24	49
*Feature 6	70	28
*Feature 7	0	18
*Feature 9	0	1
*Feature 10	0	2
*Feature 11	190	83
*Feature 12	0	60
Feature 14	234	119
Feature 15	38	38
*Feature 16	2	21
Feature 24	155	118
Feature 25	0	94
Feature 27	105	127
Feature 28	147	292
Feature 30	9	111
Feature 31	51	43
Feature 32	9	16
Feature 33	4	37
Feature 34	14	84
Feature 35	17	34
*Feature 36	41	75
Feature 39	5	37
Feature 40	70	104
Feature 41	0	107
Feature 42	2	12
*Between Ancillary Features		1,062
*Total	12,877	

Table 36: The 80 square metres selected for the 16 percent area sample.

RING 10

Inside	Outside
15N 50E	10N 51E
15N 48E	11N 45E
16N 50E	17N 53E
16N 48E	18N 53E
14N 50E	19N 45E
14N 48E	

RING 11

Inside	Outside
1N 45E	2S 48E
1N 43E	0N 48E
2N 45E	2S 40E
2N 43E	5N 40E
3N 45E	5N 47E
3N 43E	

RING 13

Inside	Outside
50S 82E	45S 84E
50S 80E	47S 85E
49S 82E	51S 85E
49S 80E	53S 81E
48S 80E	52S 78E
48S 82E	

RING 14

Inside	Outside
41S 104E	38S 105E
41S 102E	39S 101E
42S 104E	42S 107E
42S 102E	45S 100E
43S 104E	46S 106E
43S 102E	

RING 16

Inside	Outside
78S 159E	77S 157E
78S 160E	77S 161E
79S 159E	80S 157E
79S 160E	81S 161E
80S 159E	79S 162E
80S 160E	

RING 17

Inside	Outside
76S 173E	76S 172E
76S 174E	76S 176E
77S 173E	78S 176E
77S 174E	79S 172E
78S 173E	79S 176E
78S 174E	

FEATURE 14

Inside
48S 67E
48S 68E
49S 67E
49S 68E
50S 67E
50S 68E

BLOCK OF PITS (outside features/rings)

27S 68E	26S 67E
27S 67E	26S 66E
27S 66E	26S 65E
27S 65E	25S 66E
26S 68E	25S 65E

Table 37: Lithic reduction stages represented by the 16 percent sample.

	Number	Weight	Avg. Wt.	Percent #	Percent Wt.
Primary Flakes	48	4876	101.6	1.84	15.06
Secndary Flakes	184	6073.1	33.0	7.05	18.75
Tertiary Flakes	556	3683.5	6.6	21.31	11.37
Subtotal:	788	14632 g	0.18 g	30.2%	45.18%
Primary Shatter	196	8297.4	42.3	7.51	25.62
Secondary Shatter	495	6697.2	13.5	18.97	20.68
Tertiary Shatter	1130	2759.3	2.4	14.31	8.52
Subtotal:	1821	17753.9 g	0.03 g	69.8%	54.8%

Table 38: Lithic types represented in the 16 percent sample.

	Total #	Total Wt.	Mean Wt.	Percent #	Percent Wt.
1A	34	107.8	3.17	1.30	0.3328
2A	1998	29490.3	14.76	76.58	91.0574
2C	5	4.8	0.96	0.19	0.0148
3A	220	1726.2	7.85	8.43	5.3300
3B	11	34.6	3.15	0.42	0.1068
3C	1	0.4	0.40	0.04	0.0012
4A	22	40.3	1.83	0.84	0.1244
5A	22	46.8	2.13	0.84	0.1445
5B	156	516.2	3.31	5.98	1.5939
5C	26	47.8	1.84	1.00	0.1476
5E	1	0.9	0.90	0.04	0.0028
5F	4	2.6	0.65	0.15	0.0080
5G	5	18.2	3.64	0.19	0.0562
5K	21	28.2	1.34	0.80	0.0871
5M	4	2.3	0.58	0.15	0.0071
5P	2	1.2	0.60	0.08	0.0037
5R	1	0.2	0.20	0.04	0.0006
5T	15	11.4	0.76	0.57	0.0352
5U	13	15.9	1.22	0.50	0.0491
8	1	0.2	0.20	0.04	0.0006
9	5	245.6	49.12	0.19	0.7583
10	18	23.7	1.32	0.69	0.0732
11A	11	11.8	1.07	0.42	0.0364
11C	12	8.3	0.69	0.46	0.0256
12	1	0.8	0.80	0.04	0.0025
	2609	32386.5	12.41		

*See Appendix II for explanation of abbreviations.

Table 39: Metric and non-metric characteristics of projectile points.

NUM	ASSOC		PIT		DEPTH		TYPE	MAT	BL	SL	TL	MXBW	SHW	MXSW	MNSW	BSW		WLN	WRN
	DLN	DRN	HLBE	HRBE	MXBT	MXST	WT	DPF	DSF		VPF	VSF	X-SEC		DLBE	DN	DBE	DB	
11210	R#10-IN		16N	50E	0-10	(1)		5L	13.3	6.2	19.5	17.3	17.3	20.2	16.4	20.2		6.0	4.6
	1.4	0.6	4.6	4.0	5.0	4.0	1.9	OV,IR	MR,IR		OV,IR	AB	BCV		AB	PR	PR	PR	
16270	R#14-IN		41S	104E	1-10	(1)		5K	IND	10.6	IND	IND	IND	IND	IND	IND		8.3	IND
	1.9	IND	4.0	IND	IND	4.7		WL,MR	AB		WL,MR	AB	BCV		IND	PR	PR	PR	
16460	R#14-IN		41S	101E	0-10	(1)		5B	21.2	10.4	31.6	24.0	24.0	22.8	19.3	22.8		9.3	8.2
	2.3	2.3	1.4	3.7	8.1	6.2	5.8	IR,OV	IR,MR		IR,OV	AB	BCV		AB	PR	PR	PR	
14960	R#13-IN		51S	84E	0-10	(1)	BR	4A	34.4	10.6	45.0	23.8	23.8	23.1	17.0	23.1		5.8	6.7
	3.1	3.6	4.2	5.0	5.0	4.2	6.0	WL,OV	USE,MR		WL,OV	AB	PLCV		AB	PR	PR	PR	
19735	NA		30S	68E	0-10	(1)	OX	4A	11.6	7.2	18.8	13.8	13.8	14.7	11.6	14.7		3.3	4.4
	1.0	1.5	4.5	4.0	3.4	3.0	1.0	OV,WL	MR,WL		OV,WL	AB	BCV		PR	PR	PR	PR	
21496	NA		NA		SURFACE			5A	IND	9.9	IND	21.8	21.4	IND	15.1	IND		IND	8.0
	IND	2.1	IND	NA	4.6	4.3	3.3	OV,WL	AB		MR,WL	AB	PLCV		PR	PR	NA	PR	
19436	R#10-OUT		17N	53E	SURFACE			5E	IND	9.3	IND	IND	18.2	15.5	13.9	13.7		5.8	6.2
	1.8	1.7	3.0	3.7	4.7	4.7	1.5	OV,WL	IND		MR,WL	AB	PLCV		IND	PR	PR	AB	
15968	R#13-IN		47S	82E	0-10	(1)	HA	4A	IND	8.6	IND	IND	18.6	13.0	12.5	11.5		8.6	8.4
	2.0	1.2	NA	NA	IND	4.9	1.3	OV,WL	AB		OV,WL	IND	PLCV		IND	PR	NA	PR	
13233	R#11-IN		0N	45E	0-10	(1)		11A	IND	8.0	IND	IND	IND	17.3	12.9	IND		5.5	6.0
	1.1	0.9	NA	NA	IND	3.9	0.6	IND	IND		IND	IND	PLCV		IND	PR	IND	PR	
14377	R#11-IN		1N	46E	0-10	(1)		5L	IND	IND	IND	IND	IND	16.6	15.4	15.5		IND	IND
	IND	IND	1.8	NA	IND	6.7	0.9	IND	IND		IND	IND	BCV		IND	PR	PR	PR	

Table 39: Continued

NUM	ASSOC	PIT	DEPTH	TYPE	MAT	BL	SL	TL	MXBW	SHW	MXSW	MNSW	BSW	WLN	WRN	
	DLN	DRN	HLBE	HRBE	MXBT	MXST	WT	DPF	DSF	VPF	VSF	X-SEC	DLBE	DN	DBE	DB
14214	R#11-IN	6N 43E	10-20 (2)		5K	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND	
	IND	IND	IND	IND	IND	IND	0.7	IND	IND	IND	IND	PLCV	IND	PR	IND	IND
15888	R#13-IN	46S 80E	10-20 (2)		5K	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND	
	IND	IND	IND	IND	IND	IND	0.3	OV,WL	MR,USE	OV,WL	AB	IND	AB	IND	IND	IND
16407	R#14-IN	44S 100E	10-20 (2)		10	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND	
	IND	IND	IND	IND	IND	IND	1.8	IND	EX,WL	MR,WL	MR,IR	IND	AB	PR	IND	IND

See Appendix II for explanation of abbreviations.

Table 40: Metric and non-metric characteristics of bifaces.

NUM	ASSOC	PIT		DEPTH		TYPE	BL	SL	TL	MXBW	SHW	MXSW	MNSW	BSW
	ANGLE	MXBT	MXST	WT	DPF	DSF		VPF	VSF	X-SEC	DLBE	DB	MAT	
19552	NA	27S	65E	0-10	(1)	2	NA	NA	80.0	59.6	NA	NA	NA	NA
	M	23.7	NA	108.5	MR,IR	AB		EX,WL	AB	PLCV	AB	NA	3A	
14781	R#11-IN	2N	47E			2	NA	NA	47.0	34.3	NA	NA	NA	NA
	M	10.3	NA	16.7	OV,IR	AB		OV,WL	AB	BCV	AB	NA	3A	
15600	R#13-IN	51S	80E	10-20	(2)	2	NA	NA	29.4	19.6	NA	NA	NA	NA
	M,A	6.0	NA	3.9	OV,WL	AB		OV,WL	AB	BCV	AB	NA	5 0	
16464	R#14-IN	41S	104E	0-10	(1)	2	NA	NA	19.2	7.1	NA	NA	NA	NA
	M	4.8	NA	0.8	OV,WL	AB		OV,WL	AB	BCV	PR	NA	4A	
19385	NA	25S	66E	0-10	(1)	2	NA	NA	47.3	40.8	NA	NA	NA	NA
	M	17.2	NA	30.0	OV,IR	AB		EX,IR	AB	BCV	AB	NA	5A	
21495	NA	NA		SURFACE		2	NA	NA	49.6	29.7	NA	NA	NA	NA
	M,S	16.9	NA	24.9	EX,IR	AB		EX,IR	AB	BCV	PR	NA	5B	
14374	R#11-IN	1N	46E	0-10	(1)	2	NA	NA	48.0	23.0	NA	NA	NA	NA
	M,S	10.7	NA	14.0	EX,IR	AB		OV,IR	AB	PLCV	AB	NA	10	
13850	R#11-IN	2N	45E	0-10	(1)	2	NA	NA	33.0	32.2	NA	NA	NA	NA
	A	6.2	NA	5.0	EX,IR	AB		EX,IR	AB	BCV	PR	NA	10	
18716	R#17-OUT	80S	176E	10-15	(2)	1	55.2	22.5	77.7	37.9	34.2	27.8	26.7	25.2
	M	17.0	12.5	50.0	OV,IR	MR,IR		OV,IR	AB	PLCV	PR	AB	3A	
21239	F#36	31S	64E	0-5	(1)	2	NA	NA	30.4	22.1	NA	NA	NA	NA
	M	7.1	NA	5.4	OV,WL	AB		OV,WL	AB	PLCV	PR	NA	5C	

See Appendix II for explanation of abbreviations.

Table 41: Metric and non-metric characteristics of endscrapers.

NUM	ASSOC	PIT	DEPTH	STAT	AXA	AXB	AXC	AXD	WT	PRE	RED	EXT	SHAPE
MAT	WEL	WEC	WEA	LLET	LLEC	LLEA	RLET	RLEC	RLEA	PET	PEC	PEA	OTHER
9398	R#10-IN	16N 48E		CM	26.5	21.2	17.0	7.0	4.3	FL	SC	MR	OV
5D	20.0	WL	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	SP
15996	R#13-IN	50S 82E	10-20 (2)	PCM	18.5	13.3	6.3	6.3	1.5	FL	TR	MR	PL
5M	12.4	IR,USE	M	UN	IR,USE	A	UN/BF	WL,USE	M	NA	NA	IND	SP,DDE
16027	R#13-IN	48S 77E	10-20 (2)	PCM	15.1	16.2	5.8	5.8	1.5	SH	TR	MR	TR
5P	16.2	WL	M	UN/BF	USE	M	NA	NA	NA	NA	NA	IND	SP,DDE
11911	R#11-IN	4N 46E	0-10 (1)	CM	20.0	17.8	6.0	5.6	2.2	FL	TR	OV	TR
5K	17.3	WL	M	UN	WL	M	UN	WL,USE	M	NA	NA	IND	SP,DDE
16522	R#14-IN	43S 105E	0-10 (1)	CM	15.4	16.9	5.9	5.9	1.7	FL	TR	OV	CR
5M	14.6	WL	M	UN	USE,IR	M	UN	WL,USE	M	UN	WL	A	SP,DDE

Table 42: Metric and non-metric characteristics of uniface.

NUM	ASSOC	PIT	PRE	RED	SH	STAT	LN	WD	TH	WT	ANGLE	X-SEX	MAT
DPF	DSF	VPF	VSF	DDE									
17360	R#16-OUT	77S 157E	CB	PR	OV	CM	124.0	74.4	29.0	353.9	M	BCV	2A
EX,WL	AB	MR,IR	AB	PR									

See Appendix II for explanation of abbreviations.

Table 43: Metric and non-metric characteristics of marginally retouched stone tools.

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
13729	R#11-OUT		5N 47E	50.0	41.0	12.3	28.8		SH	TR	OV	1	3A
	1	AUN	IR	IR	63.0	M	8,1-3	OB					
20413	F#14		49S 67E	22.8	15.0	4.0	1.2		SH	TR	IR	1	3A
	1	UN	WL	ST	13.0	A	6,7	OB					
15993	R#13-IN		50S 82E	17.9	11.9	4.5	0.8		FL	TR	QS	1	10
	1	UN	WL	ST	12.7	A	1-3	OB					
14368	R#11-IN		2N 45E	12.8	9.0	2.2	0.3		SH	TR	TR	2	5K
	1	UN	WL	ST	12.4	M	1-3	OB					
	2	UN	WL	ST	8.3	A	4,5	OB					
20456	F#14		50S 67E	14.8	46.5	28.8	192.5		SH	SC	IR	1	2A
	1	AUN	USE	ST	105.7	M	5-8	PR					
13379	R#11-IN		3N 45E	95.6	72.3	26.6	175.4		FL	PR	CR	1	2A
	1	UN	USE	CV	75.0	M	6-8	OB					
20394	F#14		49S 67E	108.5	93.3	19.8	242.2		SH	PR	CR	1	2A
	1	AUN	IR	CV	285.0	M	1-7	OB					
12600	R#11-IN		1N 45E	105.8	57.6	20.0	133.3		SH	PR	IR	2	2A
	1	IN	USE,IR	ST	25.3	A	2	OB					
	2	AUN	IR,USE	ST	82.4	A	5-8,1	PR					
19051	NA		26S 66E	20.5	17.1	2.9	1.0		FL	TR	PL	2	11C
	1	UN	IR	ST	16.6	VA	1-3	OB					
	2	UN	WL	ST	11.0	VA	5,6	OB					

Table 43: Continued

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
19537	NA		27S 65E	122.7	87.9	24.5	331.6		FL	PR	OV	1	2A
	1	UN/BF	USE	ST	72.5	M	3-5	OB					
19751	NA		25S 65E	81.2	53.8	10.5	64.1		SH	SC	OV	2	3A
	1	UN	IR	CV	78.0	M	1-4	PR,OB					
	2	AUN	IR	IR	70.0	M	6-8	PR					
19283	NA		27S 66E	33.5	27.4	5.4	4.5		SH	TR	IR	1	3A
	1	UN	WL	ST	12.8	M	7,8	PR					
19757	NA		25S 65E	85.2	46.1	15.7	62.1		FL	SC	OV	1	2A
	1	UN	WL	CV	75.5	M	1-4	PR,OB					
18871	NA		26S 66E	21.5	13.8	4.1	1.4		SH	TR	PL	1	3A
	1	BF	USE,IR	ST	10.4	M	8,1	OB					
19777	NA		25S 65E	30.6	15.5	8.0	4.3		SH	TR	IR	1	2A
	1	UN	IR,USE	CV	28.0	M	3-5	PR,OB					
20515	F#14		49S 68E	54.4	45.9	13.0	33.1		SH	PR	TR	2	3A
	1	UN	WL	CC	11.1	M	3	PR					
	2	UN	WL	ST	45.3	M	3-5	OB					
14791	R#11-OUT		2S 40E	49.0	46.6	13.2	28.8		FL	SC	CR	2	3A
	1	UN	WL	CC	25.0	S	2,3	OB					
	2	UN	WL	CV	45.0	M	7-8,1	OB					
13724	R#11-OUT		5N 47E	75.2	47.5	21.3	54.4		SH	SC	IR	2	2A
	1	UN	WL	CV,CC	52.0	S	2-4	OB					
	2	UN	IR	ST	39.1	M	4,5	OB					

Table 43: Continued

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
16293	R#14-IN		41S 104E	116.7	93.8	30.1	421.7		CB	PR	SC	1	3A
	1	UN	WL,USE	CV	96.0	S	3-5	OB					
13722	R#11-OUT		5N 47E	79.2	69.0	23.3	140.9		FL	PR	OV	1	3A
	1	UN	IR,USE	ST	39.5	M	6,7	PR					
13735	R#11-OUT		5N 47E	40.6	25.0	10.3	14.2		SH	PR	OV	1	9
	1	UN	WL	ST	17.5	S	1,2	OB					
12262	R#11-IN		1N 45E	55.5	29.0	13.4	16.0		SH	TR	TR	1	3A
	1	UN	USE,IR	ST	16.4	A	8	PR					
12493	R#11-IN		2N 43E	47.0	34.3	15.1	20.1		SH	SC	QS	1	2A
	1	AUN	USE,IR	CV	40.0	A,M	4-6	PP,OB					
16491	R#14-IN		42S 102E	115.2	97.3	24.3	354.2		SH	PR	CR	2	2A
	1	AUN	IR	CV,CC	60.0	M	4,5	OB					
	2	UN	IR	ST	20.3	S	7	PR					
16849	R#14-OUT		39S 101E	54.0	41.8	17.8	44.9		FL	PR	OV	2	3A
	1	AUN	WL	ST	21.0	S	6,7	PR					
	2	AUN	USE	CV	35.0	M	8,1	OB					
14032	R#11-IN		1N 43E	38.6	20.8	8.0	6.7		SH	TR	IR	1	2A
	1	UN	WL	CV,CC	40.0	M	5-8,1	PR,OB					
21792	F#14		48S 68E	74.2	41.5	20.7	51.0		FL	TR	IR	1	2A
	1	UN	WL	CV,CC	78.0	M	5-8,1	PR,OB					
12633	R#11-IN		1N 45E	52.4	31.1	17.6	25.3		SH	SC	IR	1	2A
	1	AUN	IR	CV,CC	58.0	S,P	1-4	PR,OB					

Table 43: Continued

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
16253	R#14-OUT		42S 104E	102.9	74.0	51.0	359.6		SH	PR	IR	1	2A
	1	UN	IR	ST	27.9	S	5,6	OB					
20497	F#14		49S 68E	144.5	98.6	57.7	783.0		SH	PR	OV	1	2A
	1	UN	USE	CV	110.0	M	1-3	OB					
10454	R#10-IN		15N 50E	54.0	50.0	20.0	51.2		SH	SC	TR	1	2A
	1	UN	IR	SR	45.0	M	6-8,1	PR					
11767	R#10-IN		16N 46E	54.5	40.6	18.7	29.8		FL	SC	TR	1	2A
	1	UN	IR	SR	60.0	M-P	5-8,1	PR,PP					
8913	R#10-IN		11N 45E	23.7	20.6	4.6	2.3		FL	SC	IR	2	5M
	1	UN/BF	IR	CV	32.0	M	1-5	OB					
	2	UN	IR	IR	18.6	M	5-8	OB					
10452	R#10-IN		15N 50E	34.7	31.0	13.0	7.1		FL	TR	IR	2	2A
	1	UN	IR	CC	10.8	M	1-2	PR					
	2	UN	IR	ST	17.3	M	7-8,1	OB					
10540	R#10-IN		15N 48E	70.6	52.0	34.0	110.3		FL	SC	TR	1	2A
	1	AUN	IR	IR	45.0	S	4-5	PP					
10692	R#10-IN		16N 48E	152.3	58.5	57.0	713.3		FL	PR	OV	1	2A
	1	UN	WL	ST	16.4	M	1	PR					
8870	R#10-OUT		10N 51E	87.0	79.0	17.0	126.7		FL	PR	CR	2	2A
	1	UN	IR,USE	CV	75.0	M	4-6	OB					
	2	UN	USE	CV	40.0	M	8,1	OB					

Table 43: Continued

NUM	ASSOC #	 RET	PIT CHAR	LIN ES	WD LEN	TH EA	WT SECT	 OR	PRE	RED	SH	#E	MAT
8910	R#10-OUT		11N 45E	57.6	50.0	21.8	53.6		FL	SC	TR	1	2A
	1	UN	WL	SR	52.0	P	5-8,1	PR					
17027	R#16-IN		78S 159E	56.0	31.0	14.0	22.1		SH	TR	OV	1	2A
	1	UN	IR	CV	56.0	M	1-4	OB					
17371	R#16-OUT		77S 160E	110.0	78.0	19.0	187.8		SH	PR	OV	3	2A
	1	UN	IR	CV	91.5	M-S	1-3	OB					
	2	UN	IR,USE	IR	45.0	M	4-5	PR					
	3	UN	IR,WL	IR	67.7	PP	6-8	PR					
17467	R#16-OUT		80S 157E	59.7	38.0	14.6	26.5		SH	SC	IR	3	3A
	1	UN	IR	ST	19.5	P	2-3	OB					
	2	UN	IR	IR	36.0	M	4-5	OB					
	3	AUN	IR	IR	40.0	M	5-8,1	PR					
18565	R#17-OUT		79S 172E	46.6	39.3	11.7	22.1		SH	PR	IR	1	2A
	1	UN	IR	IR	44.5	M	6-8,1	PR					
18368	R#17-OUT		78S 176E	35.7	26.8	14.0	10.2		FL	SC	IR	1	2A
	1	UN	IR	IR	32.6	M	1-2	OB					
18799	R#17-OUT		79S 176E	54.0	50.8	27.0	40.1		FL	SC	IR	1	2A
	1	AUN	IR	IR	36.5	M	5-6	OB					
18363	R#17-OUT		78S 176E	42.0	37.0	16.0	25.7		SH	TR	IR	1	2A
	1	UN	IR	IR	40.0	M	7-8	OB					
18360	R#17-OUT		78S 176E	90.0	59.7	34.5	208.7		CB	PR	OV	1	2A
	1	UN/BF	IR	CV	82.4	M	6-8,1	PR					

Table 43: Continued

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
18584	R#17-OUT		79S 172E	137.2	113,6	54.0	849.5		FL	SC	IR	1	2A
	1	UN	IR	CV	135.0	M	1-4	OB					
18327	R#17-OUT		78S 176E	141.4	83.6	62.0	816.0		SH	PR	OV	2	2A
	1	UN	IR	IR	132.0	S	1-4	OB					
	2	UN	IR	IR	117.7	S	6-8	OB					
18525	R#17-OUT		79S 172E	57.0	48.0	10.6	34.3		FL	PR	CR	1	2A
	1	UN	IR	IR	31.6	M	5-7	OB					
18780	R#17-OUT		76S 172E	52.5	32.0	17.4	29.0		SH	TR	IR	1	2A
	1	UN	IR	IR	21.7	M	8,1	OB					
18467	R#17-OUT		76S 176E	168.7	43.4	17.0	58.7		SH	SC	SC	3	2A
	1	UN	IR	CV	70.0	M	1-4	OB					
	2	UN/BF	IR	IR	38.0	M	4-5	PP					
	3	UN	IR	CC	5.0	S	1	PR					
18365	R#17-OUT		78S 176E	38.4	25.0	9.5	9.9		FL	TR	IR	1	2A
	1	AUN	IR	IR	22.4	M	3-4	PR					
18361	R#17-OUT		78S 176E	64.4	25.5	26.8	45.6		SH	SC	IR	2	2A
	1	UN	IR	ST	34.6	S	5,1	PR					
	2	UN	IR	CC	6.0	P	1	PR					
18575	R#17-OUT		79S 172E	51.7	50.0	19.3	44.0		FL	SC	OV	3	3A
	1	AUN	IR	IR	39.2	M	1-3	OB					
	2	UN	IR	IR	30.7	M	4-5	OB					
	3	UN	IR	CV	20.4	P	6-7	OB					

Table 43: Continued

NUM	ASSOC		PIT	LIN	WD	TH	WT		PRE	RED	SH	#E	MAT
	#	RET	CHAR	ES	LEN	EA	SECT	OR					
18795	R#17-OUT		79S 176E	55.4	37.0	22.5	36.0		FL	SC	IR	2	2A
	1	UN	WL	CC,CV	42.0	M	1-3	OB					
	2	UN	WL	CV	10.0	M	1	OB					
18845	NA		26S 66E	71.3	33.3	16.2	47.5		SH	SC	PL	1	2A
	1	AUN	USE	CV	35.0	A	4-5	OB,PP					
19005	NA		26S 68E	51.4	32.4	15.9	26.8		SH	PR	PL	1	2A
	1	UN	WL	CV,CC	36.0	S,P	3-5	OB,PP					
19009	NA		27S 68E	60.7	43.0	12.0	33.3		SH	SC	PL	1	2A
	1	AUN	IR,USE	CV	39.0	S,M	2-3	OB					
18047	R#17-IN		78S 174E	98.9	78.0	22.6	170.0		FL	PR	PL	3	2A
	1	UN	IR,USE	CV	50.4	S	2-3	OB					
	2	UN	WL	ST	32.3	M,S	3-4	OB					
	3	AUN	IR	ST	46.0	M	5-6	OB					
17780	R#17-IN		78S 174E	84.4	49.9	15.2	81.1		SH	PR	SC	1	3A
	1	AUN	IR	CV	75.0	S	1-3	OB,PR					
17823	R#17-IN		78S 173E	61.0	36.5	17.3	39.4		SH	PR	OV	1	2A
	1	UN	WL	ST	36.1	P	6-7	PR					
18324	R#17-IN		78S 173E	138.3	113.3	47.6	788.0		FL	PR	QS	1	2A
	1	UN	WL	CC	80.0	P	1-3	OB					
17809	R#17-IN		78S 173E	79.4	75.7	47.5	178.6		SH	SC	IR	1	3A
	1	AUN	USE,IR	CV	47.0	S,P	3-4	OB					

See Appendix II for explanation of abbreviations.

Table 44: Metric and non-metric characteristics of cores.

NUM	ASSOC		PIT		DEPTH	LEN	WD	TH	WT	PRE	SH	#P	MAT	TYPE
	#	EXT	CHAR	LN	ANGLE	PLAT LOC		FACE LOC	OTHER					
16271	R#14-IN		41S 104E		0-10 (1)	168.1	150.7	65.6	1750.0	CB/SH	OV	3	2A	1
	1	MD	UN	88.0	P	PR		PR,D						
	2	EX	UN	212.2	M,S	DS		DS,D	HF,ET					
	3	MN	UN	16.0	P	V		V						
16685	R#14-OUT		42S 107E		10-20 (2)	203.4	116.5	75.5	2000.0	CB/SH	IR	1	2A	1
	1	MN	UN	58.9	P	LL,DS		LL,DS,V	ET,HF					
20532	F#14		49S 67E		10-15 (2)	108.1	73.5	47.2	545.8	CB	OV	1	2A	2
	1	MD	UN	41.0	S,P	DS,D		DS	ET,HF					
15402	R#13-IN		49S 80E		10-20 (2)	181.7	140.8	40.6	1250.0	CB/SH	OV	2	2A	1
	1	MD	AUN	230.0	M,S	LL		V	HF					
	2	MD	UN	130.0	A,M	RL		V	ET,HF					
14789	R#11-OUT		5N 47E		PEDESTAL	220.0	192.8	152.6	7100.0	CB	OV	2	2A	2
	1	EX	UN	181.0	S	DS,D		LL	HF,ET					
	2	MD	UN	100.0	P	V		V						
14347	R#11-IN		2N 45E		0-10 (1)	87.2	73.1	47.8	340.5	CB/SH	PL	2	9	1
	1	MN	UN	22.5	P	V,DS		DS						
	2	MN	UN	25.9	S	RL		RL	HF					
15400	R#13-IN		49S 80E		0-10 (1)	53.7	24.2	15.0	20.1	PB/SH	PL	2	4A	8
	1	MD	UN	23.5	P	PR		D	HF					
	2	MD	BF	21.0	P	DS		DS,D,V	HF,ET					
16266	R#14-IN		42S 104E		0-10 (1)	54.6	41.1	19.3	48.2	PB	OV	2	5K	8
	1	MD	UN	12.4	P	PR		PR,D	HF,ET					
	2	MD	BF	24.2	M	DS		DS,D,V	HF,ET					

Table 44: Continued

NUM	ASSOC		PIT		DEPTH	LEN	WD	TH	WT	PRE	SH	#P	MAT	TYPE
	#	EXT	CHAR	LN	ANGLE	PLAT LOC		FACE LOC	OTHER					
17831	R#17-IN		76S 173E		0-5 (1)	201.2	168.4	91.0	3100.0	CB	SC	1	2A	2
	1	MN	UN	21.3	S	LL,D		LL	ET,HF					
18333	R#17-IN		76S 174E		PEDESTAL	189.7	109.6	62.4	2000.0	CB	OV	1	2A	2
	1	MD	UN	45.0	A,S	PR,LL		V	HF					
17868	R#17-IN		77S 174E		5-10 (2)	71.8	56.2	37.99	1180.9	CB	CR	2	2A	2
	1	MD	UN	36.8	S,M	LL,D		V	HF,ET					
	2	MN	UN	13.0	P	DS,V		DS						
17844	R#17-IN		77S 174E		5-10 (2)	70.0	46.6	33.6	77.1	CB/SH	IR	2	2A	1
	1	MD	UN	39.4	M	LL,D		V	HF					
	2	MD	UN	61.0	M	DS,D		V	HF					
10688	R#10-IN		16N 48E		10-20 (2)	160.0	72.0	70.0	1157.5	CB	OV	1	2A	2
	1	MN	UN	19.0	P	PR		RL	ET					
10690	R#10-IN		16N 48E		10-20 (2)	123.6	112.0	77.0	1350.0	CB	IR	1	2A	2
	1	MD	UN	16.0	P	D		D,LL						
10434	R#10-IN		15N 50E		10-20 (2)	60.0	36.0	27.5	75.3	PB	OV	3	6U	5
	1	MD	UN	28.7	M	D,LL		LL	HF					
	2	MN	UN	14.5	S	D,PR		RL	HF					
	3	MD	UN	54.0	P	PR,V		RL,V						
14901	R#10-OUT		19N 45E		PEDESTAL	189.0	126.4	81.0	2150.0	CB	OV	2	2A	3
	1	EX	UN	277.0	S-P	D,PR,LL,DS		V,LL	HF					
	2	MD	UN/BF	68.0	M-S	D,V,RL		D,V,RL	HF					
17205	R#16-IN		79S 160E		10-15 (2)	117.0	110.0	53.0	626.6	CB	CR	1	2A	2
	1	EX	UN	303.0	S	V,PR,DS,LL,RL		D	ET					

Table 44: Continued

NUM	ASSOC		PIT		DEPTH	LEN	WD	TH	WT	PRE	SH	#P	MAT	TYPE
	#	EXT	CHAR	LN	ANGLE	PLAT LOC		FACE LOC	OTHER					
17022	R#16-IN		78S	159E	10-15 (2)	88.9	57.5	33.0	218.5	SH	IR	1	2A	1
	1	EX	AUN	250.0	P	V,PR,DS,LL,RL		D	ET,HF					
17012	R#16-IN		78S	160E	10-15 (2)	84.0	62.5	21.2	161.1	CB	OV	2	3A	4
	1	MN	UN	17.4	M	D,DS		V,DS	HF					
	2	MN	BF	2.0	M	D,V,LL		D,V,LL						
17285	R#16-IN		80S	160E	10-15 (2)	75.5	62.6	41.0	188.7	CB	IR	3	3B	2
	1	MN	UN	8.2	P	D,PR		V,PR	HF					
	2	MN	UN	19.3	M	D,RL		V,PR	HF					
	3	MD	UN	13.0	M	D,RL		V,RL						
19198	NA		25S	65E	10-15 (2)	120.9	111.6	56.4	917.0	CB/SH	CR	3	2A	1
	1	MD	UN	80.0	P	LL,D		LL	HF					
	2	MD	UN	20.0	P	DS		DS,V	HF					
	3	MD	UN	52.7	M,P	D,RL		D	ET,HF					
18642	R#17-OUT		79S	176E	0-5 (1)	120.4	87.7	27.8	363.9	CB/SH	OV	1	2A	1
	1	MD	UN	162.0	S	PR-LL		D	HF,ET					
18526	R#17-OUT		79S	172E	10-15 (2)	96.1	73.7	19.5	175.2	CB	OV	4	2A	4
	1	MN	UN	12.3	P	PR		PR,D	ET					
	2	MD	UN/BF	40.0	M,S	LL		D,V	HF					
	3	MN	BF	27.0	S	DS		DS,D	HF					
	4	MD	UN	26.0	M	RL		V	HF					
18585	R#17-OUT		79S	172E	5-10 (2)	120.4	84.9	43.8	436.5	CB/SH	SC	1	2A	1
	1	MD	UN	84.4	M	LL		V	ET,HF					

See Appendix II for explanation of abbreviations.

Table 45: Distribution of Fire-Broken Rock at DlOp-2.

Area	Inside #/Wt(g)	Outside #/Wt(g)
Stone Circle 10	2,414/128,095	687/18,916
Stone Circle 11	1,593/80,577	142/4,067
Stone Circle 13	1,530/190,121	308/10,913
Stone Circle 14	193/55,539	533/13,249
Stone Circle 16	550/52,363	469/31,648
Stone Circle 17	39/6,572	585/22,158
Between the Stone Circles	0/0	4,259/340,383
Totals:	6,319/513,267	6,983/441,334
Per Square Metre:	31.4	22.8
Ancillary Features	Inside #/Wt(g)	Outside #/Wt(g)
4	226/7,097	168/2,996
6	518/21,416	29/4,266
7	582/42,982	30/145
9	0/0	0/0
10	0/0	0/0
11	85/1,241	24/359
12	0/0	8/19.7
14	619/22,735	147/1,361
15	129/3,439	50/220
16	48/3,941	47/1,432
25	0/0	44/900
26	0/0	2/32
27	153/5,860	14/4,671
28	958/77,604	346/3,550
29	0/0	24/1,420
30	1/149	11/208
31	166/8,749	17/35
32	4/5,315	35/204
33	544/33,252	8/3,385
34	41/23,209	60/612
35	306/139,011	168/964
36	17/208	10/106
37	0/0	0/0
38		
39	104/3,317	195/4,535
40	212/24,760	123/12,191
41	0/0	39/591
42	217/9,295	1/2

Table 46: Distribution of faunal remains from Ross Glen.

Location	Inside #/Wt (g)	Outside #/Wt (g)	Comment
Feature 7	15/1.4	-	-
Feature 9	100/41.4	4/2.6	-
Feature 11	19/2.7	33/8.1	-
Feature 12	100/594	60/16.8	-
Feature 14	40/4.5	-	-
Feature 24	31/8.3	-	Inside Ring 11
Feature 28	347/113.6	8/2.8	Inside Ring 10
Feature 31	2/0.1	-	Outside Ring 10
Feature 32	25/3.3	-	Inside Ring 14
Feature 34	2/0.1	-	Inside Ring 13
Feature 35	3/1.0	-	Inside Ring 13
Feature 39	-	25/13.8	Outside Ring 13
Feature 40	23/10	1/0.3	Inside Ring 16
Feature 42	73/9.2	1/2.6	Outside Ring 17
Stone Circle 10	362/121.4	3/0.6	-
Stone Circle 11	51/14.7	2/0.5	-
Stone Circle 13	20/13.3	38/17.9	-
Stone Circle 14	40/9.2	10/10.8	-
Stone Circle 16	25/10.8	-	-
Stone Circle 17	-	87/16.5	-
30S 80E	19/1.8	-	-

Total faunal remains = 1028/889 g

Table 47: Summary of cultural material distribution (# per sq m for lithics and FBR only).

Ring	Lithics	FBR	Bone	Points	Biface	ES	Central Hearth	Post Mold	Features
10 inside	49.4	45.5	362	0	0	1	yes	?	2
10 outside	18.1	16.4	3	1	0	0	0	0	1
11 inside	52.7	32.5	51	3	2	1	?	yes	3
11 outside	28.3	6.2	2	0	1	0	0	0	1
14 inside	13.3	6.2	40	3	1	0	yes	yes	1
14 outside	6.8	11.8	10	0	0	1	0	0	0
13 inside	22.5	30.6	20	3	0	1	yes	yes	2
13 outside	12.6	19.3	38	0	0	1	0	0	0
16 inside	38.3	55.0	25	0	0	0	0	yes	1
16 outside	18.1	13.4	0	0	0	0	0	0	1
17 inside	52.0	4.6	0	0	0	0	0	0	0
17 outside	20.6	19.8	87	0	1	0	0	0	1
around features	18.6	36.7	371	4	4	0	0	0	12

Table 48: Summary of stone circles determined to be Besant.

Stone Circle Number	5	7	10	11	12	14
Size of Ring (m)	6.09	5.9	8.03	7.55	7.02	6.06
Average Weight of Stones (kg)	6.5	7.0	4.1	4.8	5.8	4.1
Total Weight of Ring (kg)	751.0	-	468.0	292.0	272.0	299.0
Average Depth of Ring (cm)	11.3	11.5	13.6	15.3	13.3	14.4
Number of Stones per Ring	112.0	-	114.0	74.0	47.0	73.0

APPENDIX II: Summary of Terminology and Abbreviations.

Table 49: Debitage terminology and abbreviations.

SYMBOL	DEFINITION
MAT	Lithic Material
PRFL#	Number of Primary Flakes
SCFL#	Number of Secondary Flakes
TRFL#	Number of Tertiary Flakes
T-FL#	Total Number of Flakes
PRSH#	Number of Primary Shatter
SCSH#	Number of Secondary Shatter
TRSH#	Number of Tertiary Shatter
T-SH#	Total Number of Shatter
SUM#	Total Number of Debitage
PRFL W	Weight of Primary Flakes (g)
SCFL W	Weight of Secondary Flakes (g)
TRFL W	Weight of Tertiary Flakes (g)
T-FL W	Total Weight of Flakes (g)
PRSH W	Weight of Primary Shatter (g)
SCSH W	Weight of Secondary Shatter (g)
TRSH W	Weight of Tertiary Shatter (g)
T-SH W	Total Weight of Shatter (g)
SUM W	Total Weight of Debitage (g)

Table 50: Projectile point data terminology and abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
NUMBER	Catalog Number of Specimen		
XU	Excavation Unit		
PIT	Pit Number		
DEPTH	Depth in cm Below Surface		
TYPE	Projectile Point Category		
BL	Body Length (mm)		
SL	Stem Length (mm)		
TL	Total Length (mm)		
MXBW	Maximum Body Width (mm)		
SHW	Shoulder Width (mm)		
MXSW	Maximum Stem Width (mm)		
MNSW	Minimum Stem Width (mm)		
BSW	Base Width (mm)		
WLN	Width of Left Notch (mm)		
DLN	Depth of Left Notch (mm)		
WRN	Width of Right Notch (mm)		
DRN	Depth of Right Notch (mm)		
HLBE	Height of Left Basal Edge (mm)		
HRBE	Height of Right Basal Edge (mm)		
MXBT	Maximum Body Thickness (mm)		
MXST	Maximum Stem Thickness (mm)		
WT	Weight (g)		
DPF	Dorsal Primary Flaking	AB	Flaking Absent
DSF	Dorsal Secondary Flaking	MR	Flaking Marginal
VPF	Ventral Primary Flaking	EX	Flaking Extensive
VSF	Ventral Secondary Flaking	OV	Flaking Overall
		USE	Used Patterned Flaking
		WL	Well Patterned Flaking
		IR	Irregularly Patterned Flaking
		-	A Combination of the Above
X-SEC	Cross-Sections Shape	PLCV	Plano-Convex
		BPL	Biplano
		TR	Triangular
		BCV	Biconvex
		BTR	Bitrangular
		CVTR	Convexo-Triangular
DLBE	Dulled Lateral Body Edge		
DN	Dulled Notch	PR	Present
DBE	Dulled Basal Edge	AB	Absent
DB	Dulled Base		
MAT	Lithic Material		
		NA	Not Applicable
		IND	Indeterminate

Table 51: Biface data terminology and abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
NUMBER	Catalog Number of Specimen		
XU	Excavation Unit		
PIT	Pit Number		
DEPTH	Depth in cm Below Surface		
TYPE	Biface Category		
BL	Body Length (mm)		
SL	Stem Length (mm)		
TL	Total Length (mm)		
MXBW	Maximum Body Width (mm)		
SHW	Shoulder Width (mm)		
MXSW	Maximum Stem Width (mm)		
MNSW	Minimum Stem Width (mm)		
ANGLE	Angle of Edge	VA	Very Acute: < 25°
BSW	Base Width (mm)	A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: > 86°
		-	Combination of the Above
MXBT	Maximum Body Thickness (mm)		
MXST	Maximum Stem Thickness (mm)		
WT	Weight (g)		
DPF	Dorsal Primary Flaking	AB	Flaking Absent
DSF	Dorsal Secondary Flaking	MR	Flaking Marginal
VPF	Ventral Primary Flaking	EX	Flaking Extensive
VSF	Ventral Secondary Flaking	OV	Flaking Overall
		USE	Used Patterned Flaking
		WL	Well Patterned Flaking
		IR	Irregularly Patterned Flaking
		-	A Combination of the Above
X-SEC	Cross-Sections Shape	PLCV	Plano-Convex
		BPL	Biplano
		TR	Triangular
DLBE	Dulled Lateral Body Edge	PR	Present
DB	Dulled Base	AB	Absent
MAT	Lithic Material		
		NA	Not Applicable
		IND	Indeterminate

Table 52: Endscraper terminology and abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
RLEC	Character of Retouch on Right Lateral Edge	IR	Irregular
		USE	Use
		WL	Well Patterned
RLEA	Right Lateral Edge Angle	VA	Very Acute: < 25°
		A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: > 86°
PET	Type of Retouch on Proximal End	UN	Unifacial
		AUN	Alternate Unifacial
		BF	Bifacial
		UN/BF	Unifacial Bifacial
PEC	Character of Retouch on Proximal End	IR	Irregular
		USE	Use
		WL	Well Patterned
PEA	Proximal End Edge Angle	VA	Very Acute: < 25°
		A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: > 86°
OTHER	Other Attributes	SP	Spur Present on Specimen
		NT	Notched Edges
		DDE	Discernible Dulled Working Edges
		NA	Not Applicable
		IND	Indeterminate

Table 53: Uniface Terminology and Abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
SITE	Borden Designation		
NUMBER	Catalog Number of Specimen		
XU	Excavation Unit		
PIT	Number of Pit		
QUAD	Pit Quadrant		
PRE	Preform of Specimen	PB	Pebble
		CB	Cobble
		FL	Flake
		SH	Shatter
RED	Stage of Reduction of Preform Types	PR	Primary
		SC	Secondary
		TR	Tertiary
SH	Overall Shape of Specimen	CR	Circle
		OV	Ovate
		CS	Circle Slice
		QC	Quarter Circle
		TC	One-third Circle
		SC	Semi-circle
		TR	Triangular
		PL	Polygon
		IR	Irregular
STAT	Condition of Specimen	CM	Complete
		PCM	Possibly Complete
		FR	Fragment
L	Length (mm)		
W	Width (mm)		
T	Thickness (mm)		
WT	Weight (g)		
ANGLE	Angle of Retouched Edge	VA	Very Acute: <25°
		A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: >86°
		-	A combination of the Above
X-SEC	Cross-Sectional Shape	PLCV	Plano-convex
		BPL	Biplano
		TR	Triangular
		BCV	Bioconvex
		CVTR	Convexo-Triangular
MAT	Lithic Material		
DPF	Dorsal Primary Flaking	AB	Flaking Absent
DSF	Dorsal Secondary Flaking	MR	Flaking Marginal
VPF	Ventral Primary Flaking	EX	Flaking Extensive
VSF	Ventral Secondary Flaking	OV	Flaking Overall
		USE	Use Patterned Flaking
		WL	Well Patterned Flaking

Table 53: Continued

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
		IR	Irregularly Patterned Flaking
		-	A Combination of the Above
DDE	Discernably Dulled Edges	AB	No Dulling
		PR	Dulling on Proximal End
		DS	Dulling on Distal End
		LL	Dulling on Left Lateral Edge
		RL	Dulling on Right Lateral Edge

Table 54: Marginally retouched stone tool data terminology and abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
NUMBER	Catalog Number of Specimen		
XU	Excavation Unit		
PIT	Pit Number		
L	Length (mm)		
W	Width (mm)		
TH	Thickness (mm)		
WT	Weight (g)		
PRE	Preform	PB	Pebble
		CB	Cobble
		FL	Flake
		SH	Shatter
RED	Stage of Preform Reduction	PR	Primary
		SC	Secondary
		TR	Tertiary
SH	General Shape	CR	Circular
		OV	Ovate
		SC	Circle Slice
		QS	Quarter Circle
		TC	One-Third Circle
		SC	Semi-circle
		TR	Triangular
		PL	Polygon
		IR	Irregular
# EDGES	Number of retouched edges on specimen		
MAT	Lithic Material		
#	Individual Retouched Edge Number		

Table 54: Continued

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
RET	Type of Retouch	UN	Unifacial
		AUN	Alternate Unifacial
		BF	Bifacial
		UN/BF	Unifacial/Bifacial
CHAR	Character of Retouch	USE	Use
		IR	Irregular
		WL	Well Patterned
		-	A Combination of the Above
SHAPE	Shape of Retouched Edge	ST	Straight
		CC	Concave
		CV	Convex
		NT	Notched
		SR	Serrated
		IR	Irregular
LEN	Length of Retouched Edge (mm)		
ANGLE	Angle of Retouched Edge	VA	Very Acute: <25°
		A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: >86°
		-	A combination of the above
SECTOR			
ORIENT	Orientation of Retouched Edge to Long Axis of Specimen	PR	Parallel
		OB	Oblique
		PP	Perpendicular

Table 55: Core Tool Data Terminology and Abbreviations.

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
NUMBER	Catalog Number of Specimen		
XU	Excavation Unit		
PIT	Pit Number		
DEPTH	Depth in cm Below Surface		
L	Length (mm)		
W	Width (mm)		
TH	Thickness (mm)		
WT	Weight (g)		
PRE	Preform	PB	Pebble
		CB	Cobble
		FL	Flake
		SH	Shatter
SHAPE	General Shape of Specimen	CR	Circular
		OV	Ovate
		CS	Circle Slice
		QC	Quarter Circle
		TC	One-third Circle
		SC	Semi-circle
		TR	Triangle
		PL	Polygon
		IR	Irregular
#PLAT	Number of Platform Edges on Specimen		
MAT	Lithic Material		
#	Individual Platform Edge Number		
EXT	Extent of Platform Utilization	MN	Minimal
		MD	Moderate
		EX	Extensive
CHAR	Character of Flake Removal	UN	Unifacial
		AUN	Alternate Unifacial
		BF	Bifacial
		UN/BF	Unifacial/Bifacial
LEN	Length of Platform Edge (mm)		
ANGLE	Platform Angle	VA	Very Acute: 25°
		A	Acute: 26° - 50°
		M	Medium: 51° - 75°
		S	Steep: 76° - 85°
		P	Perpendicular: 86°
		-	A Combination of the Above

Table 55: Continued

DATA CATEGORY		DATA ENTRY	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
FACE LOC	Platform Face Location	D	Dorsal
		V	Ventral
		PE	Proximal End
		DE	Distal End
		LLS	Left Lateral Side
		RLS	Right Lateral Side
		-	A Combination of the Above
PLAT LOC	Platform Edge Location	PR	Proximal
		DS	Distal
		LL	Left Lateral
		RL	Right Lateral
		-	A Combination of the Above
OTHER	Other Attributes	ET	Edge Trimming
		HF	Hinge Fracturing
		CR	Crushed Platform Edge
		DL	Dulled Platform Edge
SITE	Borden Designation		
		NA	Not Applicable
		IND	Indeterminate

Table 56: Summary of Defined Lithic Types (after Brumley 1981a)

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
1A	Massive Quartz	Very coarse to coarse	Fine to coarse uneven fracture	This material occurs as unmodified cobbles in river gravels and glacial tills throughout southern Alberta.
2A	Quartzite	Fine grained to coarse	Uneven	This material occurs commonly in gravel and till deposits throughout southern Alberta.
2B	Quartzite	Fine grained	Even to Conchoidal	Dry Creek and Ayers in western Montana.
2C	Quartzite	Fine grained with vesicles	Conchoidal to even	This material occurs as surface outcrop of a massive bedrock at the Beaver Creek quarry.
2D	Quartzite	Coarse	Conchoidal	This material appears to originate in the Cypress Hills area where it is probably found as cobbles.
3A	Argillite	Fine grained	Uneven	Common name: Grinnel Argillite. Occurs commonly in gravel deposits throughout southern Alberta. Large bedrock outcrops in the foothills of southern Alberta are probably the origin sources of material.
3B	Argillite	Fine grained	Uneven	Common name: Appekunny Argillite. Occurs commonly in gravels and other deposits throughout southern Alberta. Believed to originate from a number of bedrock outcrops in the foothills of southern Alberta.
3C	Argillite	Fine Grained	Conchoidal	Occurs as large pebbles in stream and river gravels in most areas of southern Alberta. No one source is known.

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
3D	Argillite	Very fine grained	Even	Common name: Kootenai Argillite. Material is thought to originate near the west side of Kootenai Lakes in SE British Columbia. It is unknown if material occurs in bedrock formations, but cortex has not been observed on recovered specimens.
4A	Petrified Wood	Fine to very fine grained	Generally uneven along cleavage planes	This material occurs as small to large water rolled cobbles in gravel and glacial deposits throughout southern Alberta.
5A	Chert	Very fine grained, may be slightly to moderately fractured with versicles	Even to uneven	Common name: Swan River Chert. This material occurs as pebble to small cobble-sized nodules in gravels and, less commonly, glacial deposits throughout southern Alberta.
5B	Chert	Very fine grained, fracture patterns and vesicles may be present	Even to uneven	Common name: Swan River Chert. This material occurs as pebble to small cobble-sized nodules in gravels and glacial deposits throughout southern Alberta.
5C	Chert	Very fine grained; may contain fractures and vesicles	Even to uneven	Common name: Swan River Chert. This material occurs as pebbles and small cobble-sized nodules in gravels and glacial deposits throughout southern Alberta.

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
5D	Chert	Fine to very fine grained	Conchoidal to even	This material occurs as pebble-sized nodules in gravels and glacial deposits throughout SE Alberta.
5E	Chert	Fine grained	Even	Common name: Avon Chert. Material is from the Avon quarry of west central Montana.
5F	Chert	Fine grained	Even to uneven	Common name: Pebble Cherts. Material occurs in gravel and glacial deposits throughout southern Alberta and northern Montana. The bedrock source is apparently several thin lenses within the Bearspaw Formation.
5G	Chert	Fine grained	Even	Common name: Pebble Cherts. Material occurs in gravel and glacial deposits throughout southern Alberta and northern Montana. The bedrock source is apparently several thin lenses within the Bearspaw Formation.
5H	Chert	Fine grained	Even to fibrous	Material occurs in gravel and glacial deposits throughout southern Alberta and northern Montana.
5I	Chert	Fine grained	Even to fibrous	Material occurs in gravel and glacial deposits throughout southern Alberta and northern Montana.
*5J	Undefined Lithic Category			
5K	Chert	Very fine grained	Conchoidal	Common name: Generally referred to as Montana Cherts. Material occurs in ten quarries in western Montana (Squaw Creek, Logan, Vanochen, Dogett, Helena, Schmitt, Avon, Garnet, Smith River, South Everson).

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
5L	Chert	Very fine grained	Conchoidal	Common name: Generally referred to as Montana Cherts. Material generally occurs in glacial gravels in Montana and SW Alberta. Known Montana quarries include South Everson, Helena, Squaw, Garnet Mountain, Little Rockies.
5M	Chert	Very fine grained	Conchoidal	Common name: Knife River Flint. Specimens occur in at least 3 known quarries, 2 in Montana (South Everson, Vanochen) and 1 in North Dakota (Knife River). There may be other isolated localities in the foothills.
5N	Chert	Very fine grained	Conchoidal	Material occurs in 8 known quarries: 6 in western Montana (Helena, Dogett, South Everson, Dringle, Vanochen, Schmitt); 1 in SE British Columbia (Top-of-the-World); and 1 in SW Alberta (Etherington).
5O	Chert	Very fine grained	Conchoidal to even	Material occurs in 7 known quarries: 5 in Montana (Little Rockies, Smith River, Schmitt, South Everson, Vanochen); 1 in SE British Columbia (Top-of-the-World); and 1 in SW Alberta (Etherington).
5P	Chert	Very fine grained	Conchoidal	Material occurs in 11 known quarries: 9 in Montana (South Everson, Schmitt, Logan, Vanochen, Helena, Dogett, Avon, White Cow, Smith River); 1 in SW Alberta (Etherington); and 1 in SE British Columbia (Top-of-the-World).
5Q	Chert	Very fine grained	Conchoidal	Specimens have been found in the foothills of Alberta (specifically Bow River valley) generally in cobble form. No known quarry has been discovered. The material is probably available throughout the foothills.

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
5R	Chert	Very fine grained	Conchoidal	The material occurs in pebble and cobble form in the river valleys along the foohills of SW Alberta.
*5S				
5T	Chert	Fine grained	Conchoidal	This material comes from the Cypress Hills area and is probably out of the gravels throughout the hills. It is assumed to be from the large pebbles or cobbles and not from exposed bedrock.
5U	Chert	Fine grained	Conchoidal	The material undoubtedly occurs in pebble form in the glacial gravels throughout the Cypress Hills region. No one specific source has been identified.
6A	Basalt	Fine grained to coarse, has some vesicles	Conchoidal	This material generally comes from interior British Columbia.
7A	Fired Shale	Fine Grained	Uneven	This material is usually available within SE Alberta in association with fired coal beds.
7B	Porcellanite	Very fine to fine grained	Even	This material appears to represent Fort Union Porcellanite derived from the area of SE Montana and Wyoming. One known source is the Tongue River.
7C	Porcellanite	Very fine grained	Even to Conchoidal	This material appears to represent Fort Union Porcellanite derived from the area of SE Montana and Wyoming.

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
7D	Porcellanite	Very fine to fine grained	Even to Conchoidal	This material is from Belfield, North Dakota and Tongue River, Montana.
7E	Porcellanite	Very fine grained	Even	This material appears to represent Fort Union Porcellanite derived from SE Montana and northern Wyoming. Specifically these specimens are from Miles City, Montana.
8	Obsidian	Vitreous	Conchoidal	This material probably orginates from the Yellowstone Park area of NW Wyoming.
9	Miscellaneous Lithics	Coarse to very coarse grained	Varied	Varied
10	Miscellaneous Lithics	Fine grained to vitreous	Varied	Varied
11A	Silicified Siltstone	Fine grained	Even to slightly conchoidal	This material comes from the Banff Formation along the foothills of southern Alberta.
11B	Silicified Siltstone	Very fine grained	Conchoidal	This material comes from the foothills (Bow River Valley west of Bragg Creek) of Alberta but no actual quarry is known. The cortex on the pebble- to cobble-sized material indicates that it comes in cobble form and not from veins in bedrock.

Table 56: Continued

GROUP	MATERIAL	TEXTURE	FRACTURE	KNOWN SOURCES
11C	Silicified Siltstone	Fine grained	Even to conchoidal	This material was recovered from the eastern slopes of the Rocky Mountains. It is believed to originate in the quarry source that Choquette (1973:119) records as being above the Movie River in the central Purcell Mountains of east Kootenay region. This material is believed to occur in veins of bedrock and not in cobble form.
12	Dolomite & Limestone	Fine grained	Even to conchoidal	This material occurs commonly in gravel and till deposits throughout southern Alberta.

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